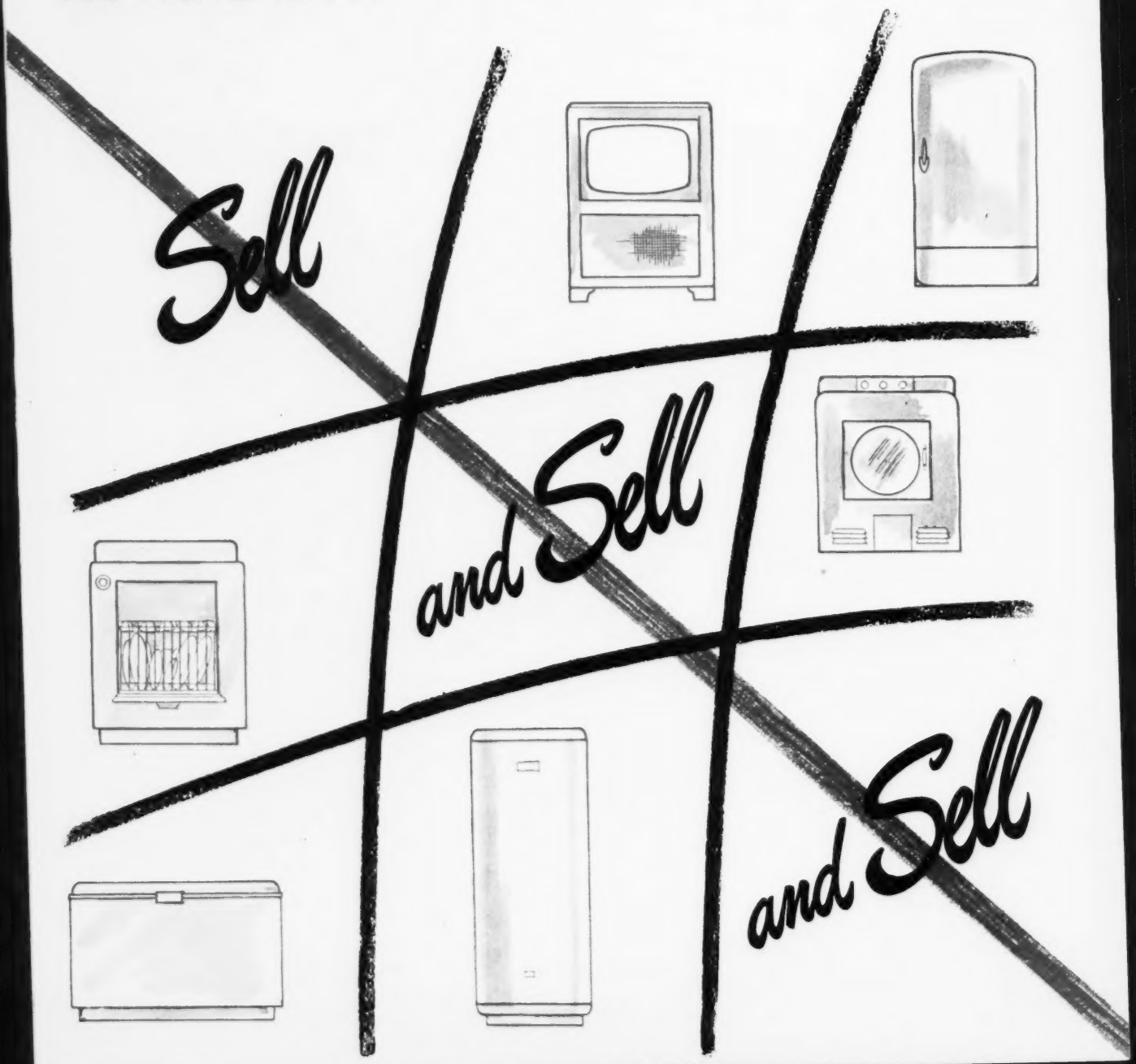
MAY 18, 1953

Electrical World

Price 35 Cents

A McGRAW-HILL PUBLICATION

To Win in the Electric Appliance Business You Have to . . .



Compare the Costs of Voltage Regulation

4160 Volt Y Substation Load of 3000 Kva, Two 200 Amp Radial Feeders

	Cost of ±10% Regulation
Single-phase Feeder Regulation with six 200 ampere Station Regulators	$15,492
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ALLIS-CHALMERS
5/8% STEP VOLTAGE REGULATORS

Get Accurate, Reliable Service

The chart above shows why it will pay you to analyze changes in system economics brought about by Allis-Chalmers distribution regulators. They give you highest quality voltage regulation at a cost lower than any other method of regulating voltage.

Result of 20 Years of ⅝ % Development

Allis-Chalmers distribution regulators give you all the advantages of ⅝% step regulation. You get a ± 1 volt band, 20% range, and a wide line that includes a rating for nearly every voltage need. In addition, you get Allis-Chalmers features like "Feather-Touch" control, unit-type construction, long-life contacts, and a mechanism that can withstand five million operations.

Get Cost Comparison Charts

A set of six charts is available to help you analyze savings you can make on many different systems with Allis-Chalmers distribution regulators. Call your nearby A-C district office or write Allis-Chalmers, Milwaukee 1, Wisconsin, for full information. A-4043

ALLIS-CHALMERS

Originators of ⅝% Step Regulation

Do You Know—

What will produce a better than 76% upswing in **residential usage** during the 8-year period starting in 1952? See page 141.

That fewer than 10% of American families today have **more debts than assets?** See Statistics.

That **trial installation** of street lighting in Baton Rouge convinced city officials of the need, and accident records of the trial stretches helped them choose the most suitable type of lighting for their locality? See Sales and Service.

A new up-to-date rate book is available showing schedules for residential, commercial, and power customers of privately operated companies? See the Financial pages.

The British who have been **low bidders** on numerous electrical projects in this country are noticing increasing competition from both Western and Eastern Germany? See the Manufacturers & Markets section.

Counting on the fingers has been practically eliminated everywhere but in the first few grades of elementary school? A big help to those who find trouble in **counting** over one thousand per second are such modern items as electronic counters capable of making an accurate tally at speeds up to one million per second. See New Equipment.

That there is a new method being used to weigh large quantities of hay in Hawaii. An ammeter records current used to lift the load and **weight is computed** from amperage? See Industrial Applications.

What was the **value of new securities** sold by the industry during first quarter? See the Financial section.

Canadian power is definitely **hydro** and likely to remain so for a long time, isolated use of steam and talk of atomic power not withstanding. See the News pages.

Electrical World

Published for 79 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

Vol. 139 No. 20 — May 18, 1953

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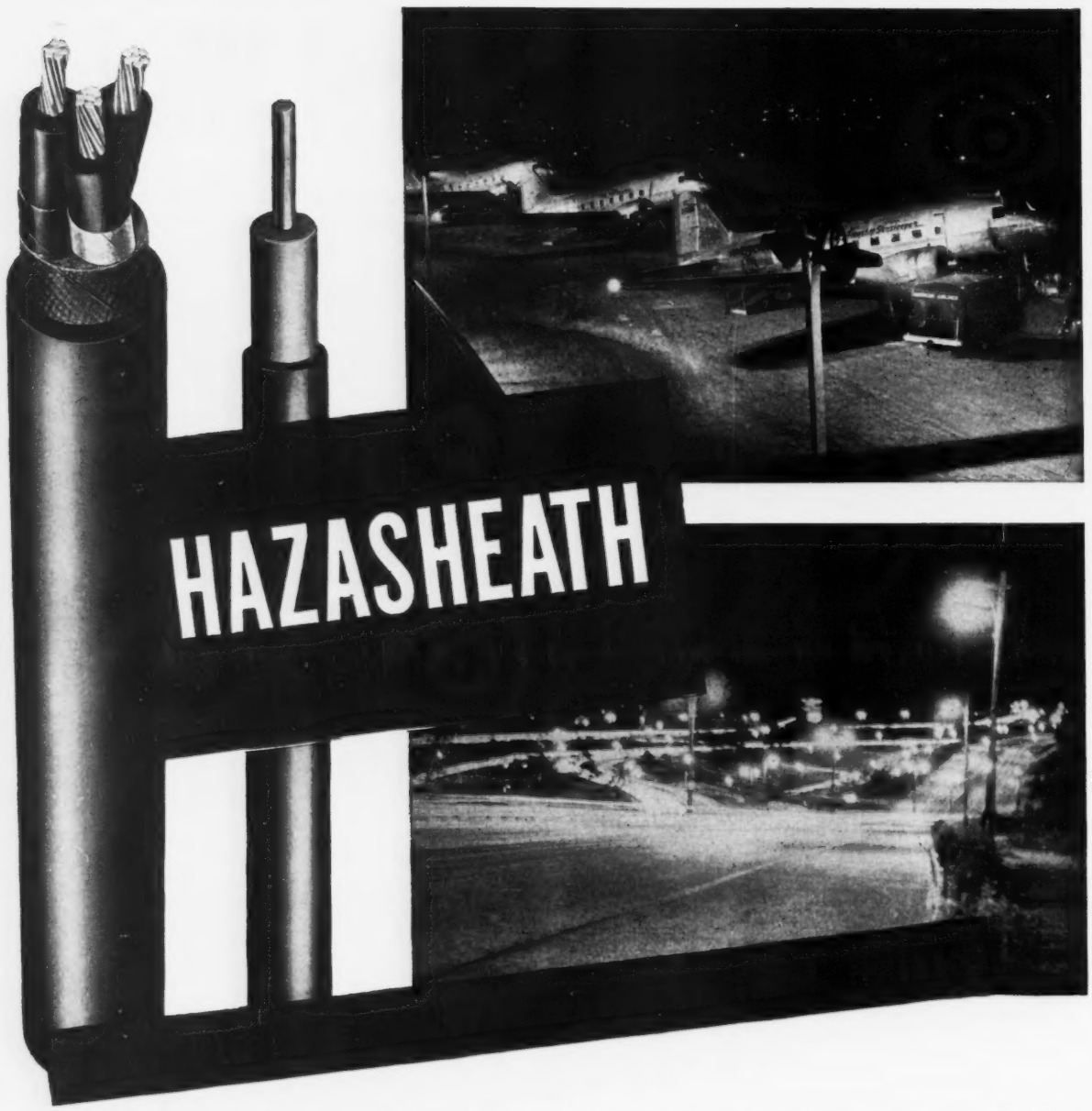

Cable dependability is essential in airport and street lighting circuits. In addition to the danger to aircraft and automobile traffic, cable failure means great expense for repair or replacement. Underground, cable must be dependable to be economical... and here's where Hazasheath performance pays off.

Top quality materials plus simplicity of construction combine to provide Hazasheath's long-lived reliability. Hazard Watertite insulation, a rich rubber compound designed for superior moisture and heat resistance, maintains its excellent electrical and mechanical properties even after years of continuous immersion in water. The Hazaprene sheath, vulcanized under heavy pressure in a metal mold, adds a tire-tough covering to withstand chemically and physically all the rigors of underground service.

Hazasheath Underground Cable, Type RR, has the approval of the Civil Aeronautics Authority for airport lighting systems. When planning any type of underground installation, investigate the advantages of Hazasheath. Ask your Hazard representative for full information or write today to the Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pennsylvania.

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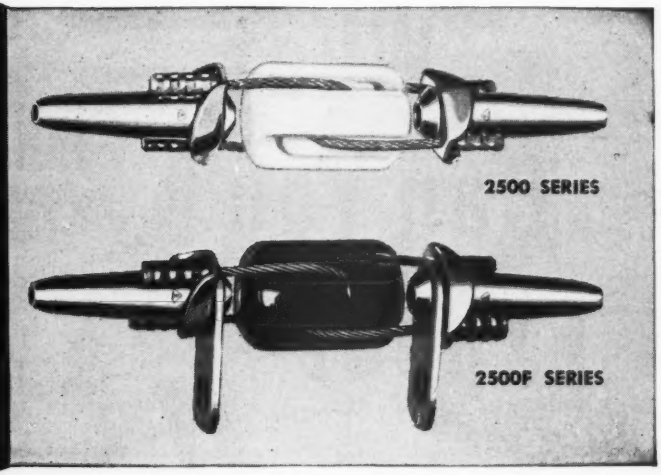
for the largest number of line applications at the lowest possible cost...

USE *Electroline* Insulating Automatic Line Splice SECTIONALIZERS



The Electroline Sectionalizers are assemblies that will function in service as most convenient, reliable and yet low cost interrupting devices. Series 2500-F and 2600 provide for paralleling with a fuse element for further protection when sectionalizing. The mechanical strength of these assemblies exceeds in all cases the rated breaking strength of the conductor for which they are adapted.

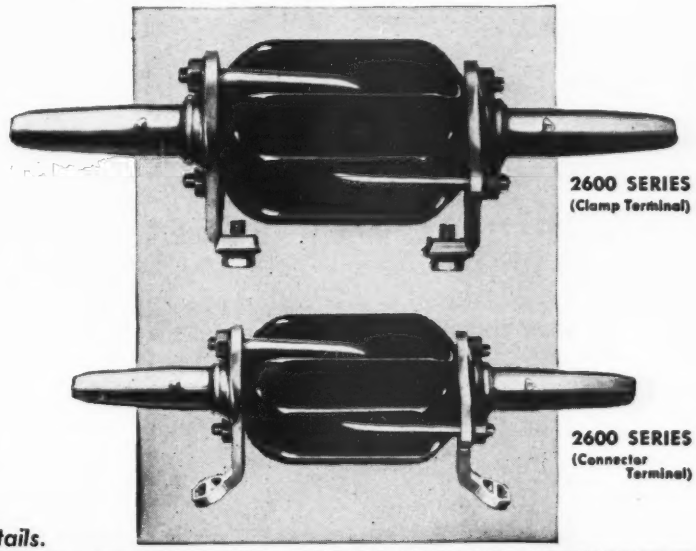
These Insulating Automatic Line Splice Sectionalizers are ideal for:

Installing Regulating Equipment,
simplifies cutting-in disconnecting points, fuses, voltage regulators and series capacitors;

Restoring Service,
providing points to test for trouble;

Sectionalizing Networks,
to readily isolate and test the area in trouble;

Series Street Lighting,
simplifies cutting-in series street lamps—merely cut the line and insert conductor ends into sectionalizer.



Send for Bulletins containing complete details.

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Full Range Protection ?

—protection against low current faults as well as high, under all conditions of recovery voltage

Accurate Protection ?

—time-current characteristics which are completely accurate, and which conform rigidly to published curves

Dependable Protection ?

—operating characteristics unchanged by vibration, aging, atmospheric conditions, surges, or fuses blowing on other phases

S&C POWER FUSES have all these characteristics. Their lifelong accuracy permits systems to be planned with close multistep coordination between protective devices . . . brings a **NEW ERA** of system protection . . . **NEW THINKING** about how fuses can be used to better advantage, and **NEW CONCEPTS** of the place for fuses in protecting lines and equipment.
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separates arcing terminals quickly and positively
CO_2 GAS BOMB
UPPER STRESS CONE
withstands high recovery voltage
ARC EXTINGUISHING CHAMBER
where the arc is drawn and extinguished
BORIC ACID LINING
FUSIBLE ELEMENT
LOWER STRESS CONE
withstands high recovery voltage and confines arc core within fuse tube
CORONA SHIELD
protects fusible element from corona damage

COMPANY

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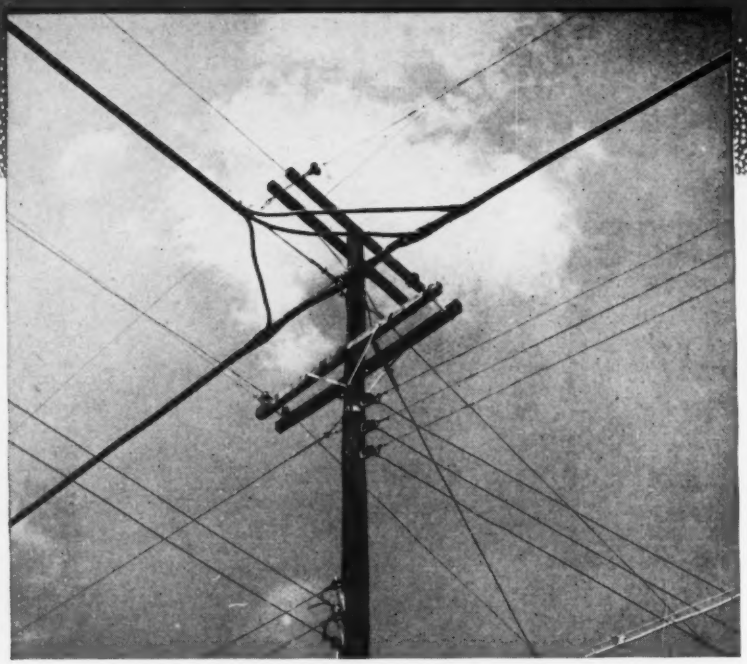
CIRCUIT INTERRUPTION

DO YOUR OVERHEAD LINES LOOK LIKE THIS?



This photograph shows many of the reasons why you should consider installing aerial cable instead of line wire. Notice what a neat, compact job the linemen have done and how unobtrusively the cable fits into the picture. Wouldn't you like your overhead lines to look like this?

It is a safe job too because the cable is completely insulated. Even if the cable should fall, which is highly unlikely, there is little or no danger to passers-by. Experience has shown that insulated aerial cable is the safest form of above ground transmission. Wouldn't you like that?

Notice how flexible the installation is too. See what a good looking "Y" tap has been taken off and notice the streamlined appearance of the splices. There is little danger here from swinging arcs or grounds caused by wet conditions. This type of an installation will reduce your trouble calls from owners of television sets. Wouldn't you like to increase safety and cut down on customer complaints?

Insulated aerial cable leaves the pole in an uncluttered state. Wouldn't you like to leave the impression with your customers that you practice good housekeeping?

These advantages and more can be yours if you use Simplex Aerial Cables. You will find that they are exactly what you want. They are made in various styles and sizes to meet varying conditions. Want more information about these versatile distribution lines? A note to the address below will bring it to you without obligation.

Simplex - WIRES & CABLES

SIMPLEX WIRE & CABLE CO.
79 SIDNEY STREET,
CAMBRIDGE 39, MASS.

Hard to hear what's being said in *your* plant?

It won't be—if your plant is equipped with a Gai-Tronics Communication System. A Gai-Tronics System is fast and sure, because practically normal conversation is possible where noise is a problem —*even without* acoustic booths!

With a Gai-Tronics System, two-way or group-conversations take place over special telephone-type handsets and sound projectors, especially designed for operation in high noise levels. Emergency instructions can be heard in all areas *at once!* This means no shouting, no strain, no garbling of important instructions. Damage to costly equipment is prevented, shutdown time is reduced, hazard during start-ups is minimized, and manpower is used more efficiently! If you desire, telephone-type privacy may be had with the flick of a switch, even though the system remains alerted for emergency use.

A Gai-Tronics System is surprisingly low-priced because it is designed by specialists thoroughly familiar with *all* the problems of power plant operational intercommunication. It is thoroughly engineered for *your* plant and *your* operational procedure. Effective, trouble-free operation; simplicity and economy of installation and maintenance are paramount design features. A Gai-Tronics power plant communication specialist will be glad to discuss your communication problems at your convenience.

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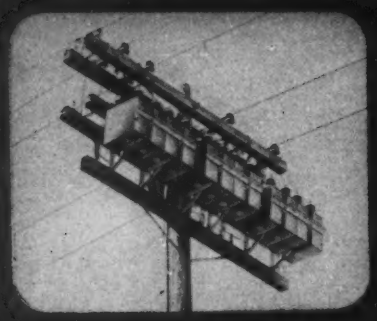

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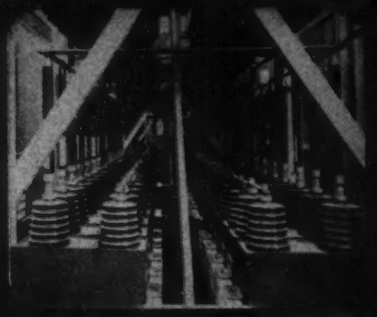

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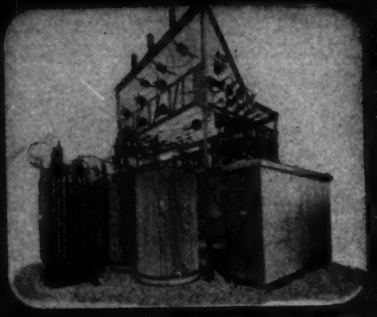

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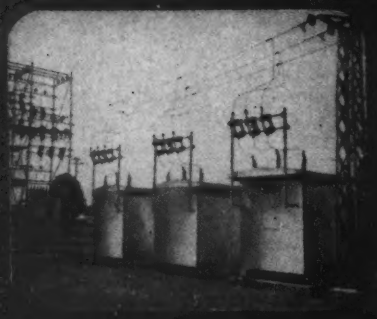

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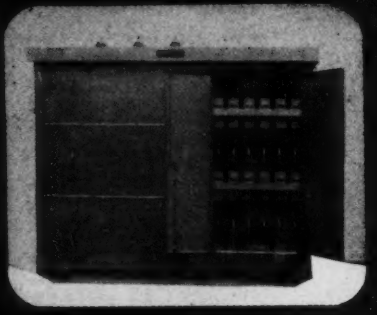

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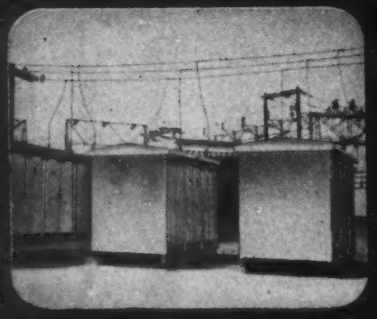

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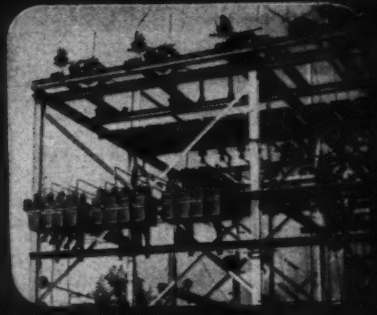

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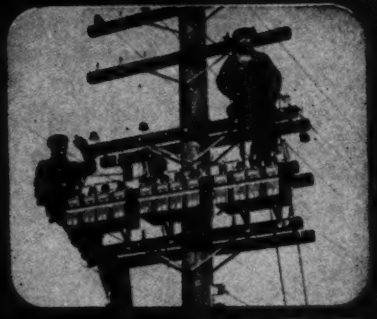

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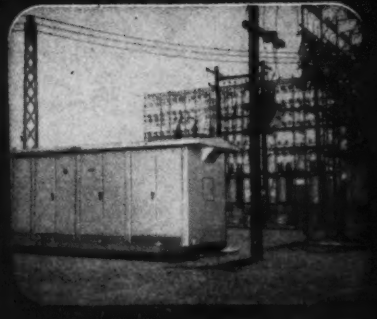

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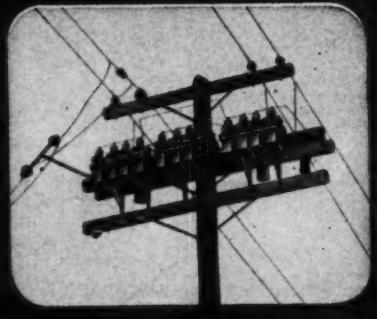

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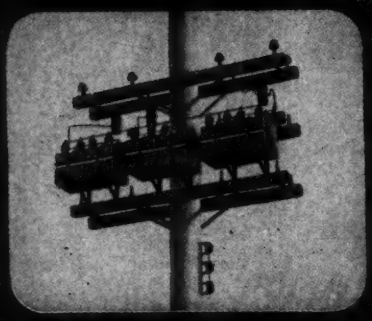

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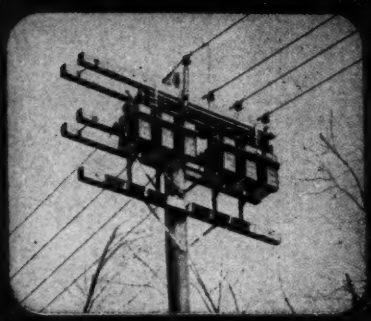

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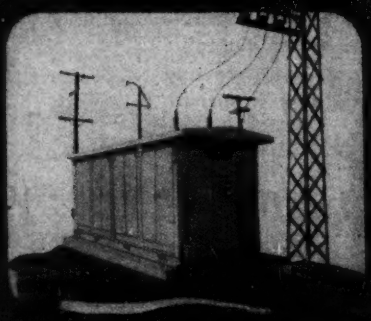

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You will find them in the stations and on the poles of the country's largest power producers: C-D capacitors that have been in continuous operation since 1938, 1939, 1940 with *little or no maintenance required!* Over 4,000 time-tested C-D installations confirm that this is truly the most *consistently dependable* capacitor for power-factor improvement.

C-D gives you these extra safety factors

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- Only C-D capacitors (from 230 to 13,800 volts), are subjected to a full rated voltage energization test.
- Wide margin between paper and foil provides higher insulation level.
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- Heavy-Duty wet process porcelain bushings for longer creepage path, less breakage, higher impulse rating.

Planning an installation of industrial, station or pole-type capacitors for power-factor improvement? You can save maintenance dollars and insure trouble-free service by talking it over with a C-D engineer. Cornell-Dubilier Electric Corp., Dept. D-53, South Plainfield, N. J.

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CORNELL DUBILIER

CAPACITORS

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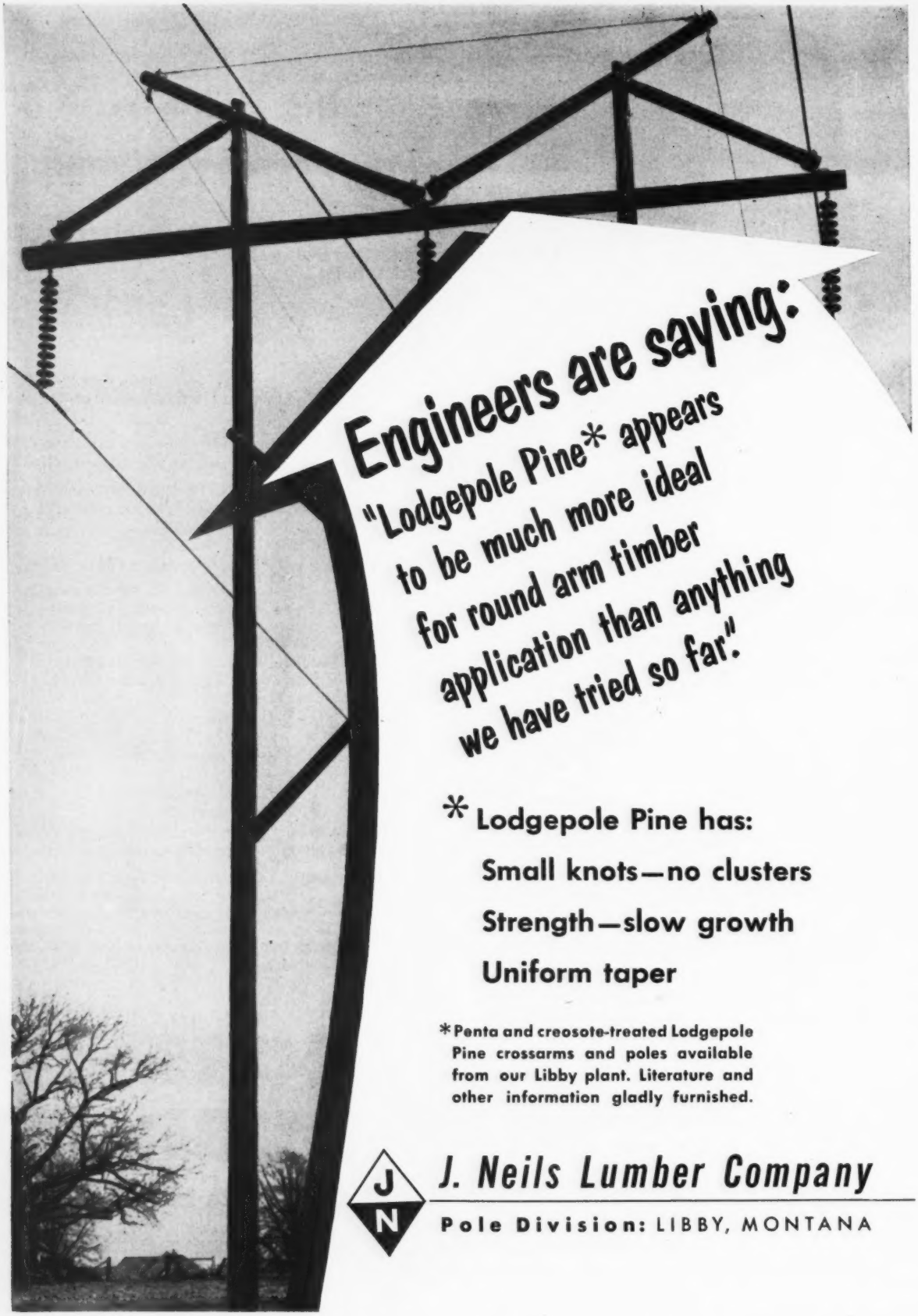

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* Lodgepole Pine has:

Small knots—no clusters

Strength—slow growth

Uniform taper

*Penta and creosote-treated Lodgepole Pine crossarms and poles available from our Libby plant. Literature and other information gladly furnished.

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Pole Division: LIBBY, MONTANA

...for Motorized Valves

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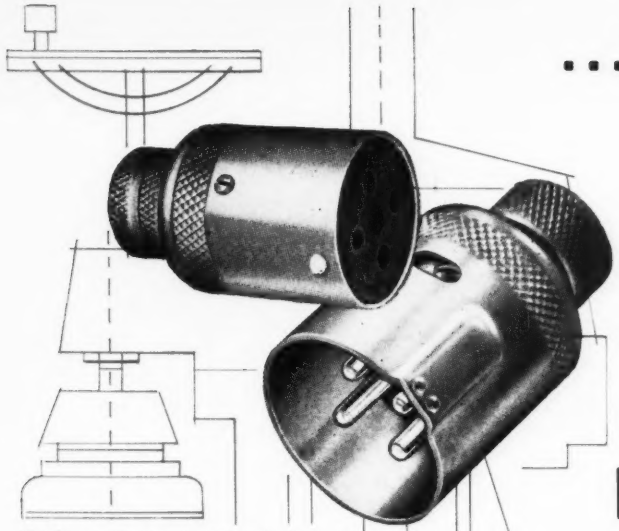
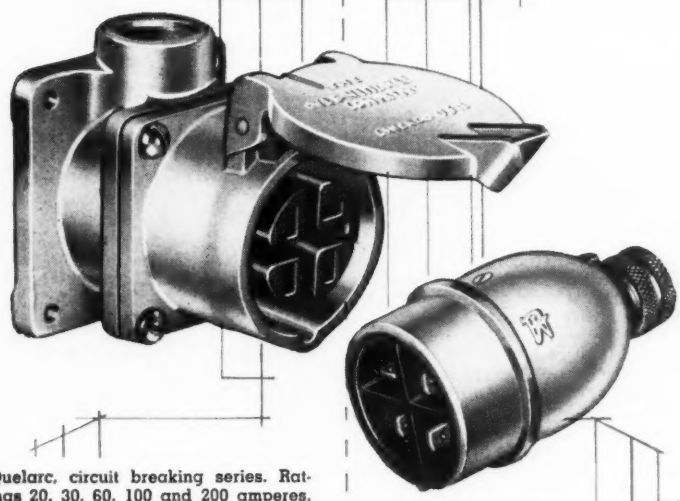
PLUGS and RECEPTACLES

- *Shorten out-of-service time*
- *Assure proper reconnection*
- *Save time and labor*



*Triploc, multi-circuit series. 1, 2, 3, 4, 6, 8, and 12 pole contact units interchangeable and reversible in any single set of housings. Housings of pressed steel with automatic lock or of cast metal threaded for watertight gasket seal. 2, 3 and 4 gang unit types for up to 48 poles also available.



*Quelarc, circuit breaking series. Ratings 20, 30, 60, 100 and 200 amperes, 250 volts d.c., 600 volts a.c. 2, 3, and 4 pole. Threaded cap, plain and hinged spring door housings.

*Trademark Reg. U.S. Pat. Off.

Pyle-National's safe, easy-to-handle heavy-duty plugs and receptacles quickly pay for themselves when used for connecting motorized valves or any other electrical equipment that must ever be relocated or disconnected for inspection or repair.

These prepolarized connectors not only eliminate the labor expense involved in disconnecting individual wires from junction boxes (or breaking soldered connections) and marking wires and terminals, but in addition, cut to a minimum the length of time valuable equipment is kept out of service.

The multiple-pole TRIPLOC series will handle any combination of power and control circuits. The heavy-duty QUELARC series will handle loads up to 200 amperes. Indeed, there is a Pyle connector for every application, including an explosion proof series for hazardous locations. Write for detailed literature.

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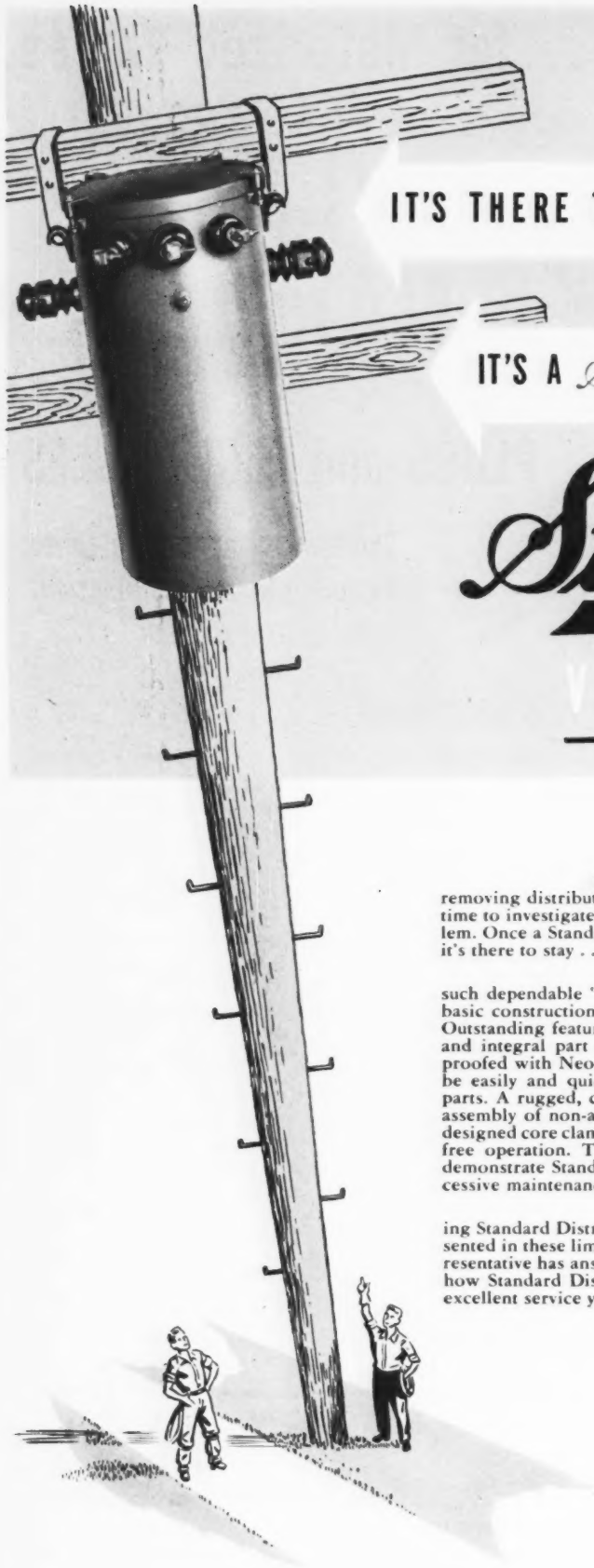


IT'S THERE TO STAY...

IT'S A *Standard* TRANSFORMER

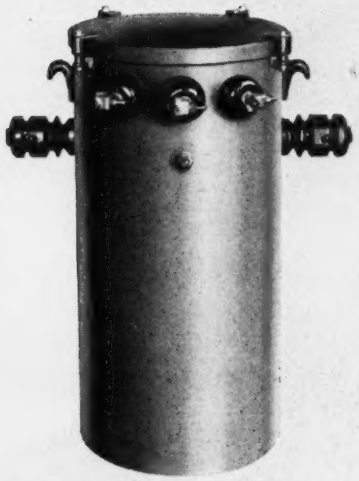
Standard
TRADE MARK ®

VITAL PART OF

● If transformer failure keeps your linemen busy removing distribution transformers and installing new ones, then it's time to investigate Standard Transformers as a solution to your problem. Once a Standard Distribution Transformer is installed on a line, it's there to stay . . . silently channeling current to your customers.

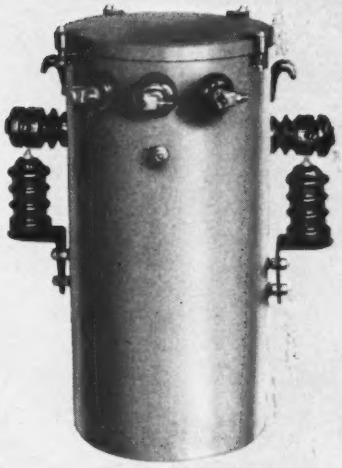
What makes Standard Distribution Transformers such dependable "watch dogs"? Close examination discloses sound, basic construction in full accordance with ASA and REA standards. Outstanding features set them apart from others as an indispensable and integral part of your distribution system. Covers are moisture-proofed with Neoprene gaskets which prevent oil leakage. They can be easily and quickly removed, allowing immediate access to vital parts. A rugged, copper-bearing steel tank houses the low-loss core assembly of non-aging, varnish-coated, silicon steel sheets. Specially designed core clamps hold core rigidly in place assuring quiet, trouble-free operation. These, plus numerous other construction features, demonstrate Standard Transformers to be helpful in solving your excessive maintenance problem.

Naturally, you want more information concerning Standard Distribution Transformers than that which we have presented in these limited words. Your nearby Standard Transformer representative has answers to your questions. Call him. Let him show you how Standard Distribution Transformers can help you maintain the excellent service your customers deserve.

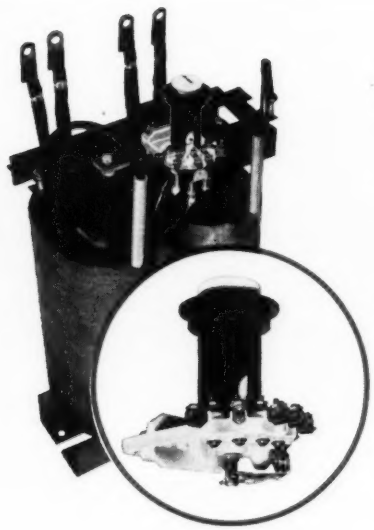


Type A. OISC Conventional Distribution Transformer, 15 KVA, single phase, 60 cycle, with side wall mounted high voltage bushings. Standard construction for voltages 5 KV and sizes through 100 KVA.

Type CSP. OISC Distribution Transformer, 15 KVA, single phase, 60 cycle, with primary lightning arresters, internal fuses, low voltage circuit breaker and side wall mounted high voltage bushings. Standard construction for voltages 5 KV and less and sizes through 100 KVA.



TRANSFORMERS ARE A
YOUR DISTRIBUTION SYSTEM

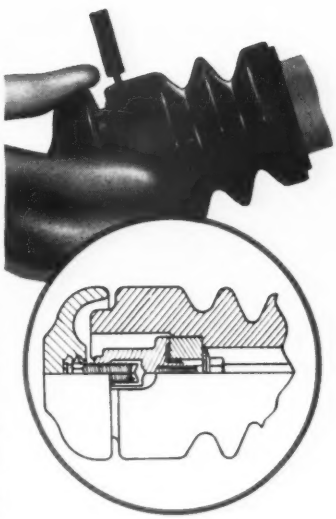


NEW TANK WALL BUSHINGS →

New bushings permit "flick-of-the-wrist" line insertion without tools. No live parts are exposed. Terminal compression stud keeps easy-to-grip, insulated porcelain cap from falling off when unscrewed to receive primary leads. Cables can be brought in from either side and held securely by pressure from the clamping shoe. Makes for faster, safer, easier installations.

← TAP CHANGER SWITCH

Standard's new Tap Changer Switch embodies a contact-making assembly with a brass wheel for positive contact. Normal settings are with 4-tap voltage section. 2½ % taps within 10% range of normal rating. Standard supplies transformers with 4 taps above or below, or half above and half below as specified by the customer. This is available at no extra cost to you. Contact-making points are submerged in oil with the handle well above oil level.



THE STANDARD TRANSFORMER COMPANY

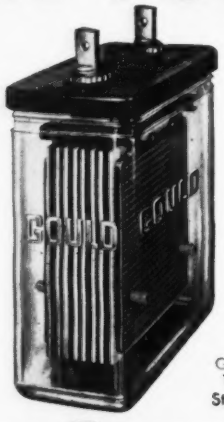
Trade Mark ®

WARREN, OHIO
REPRESENTATIVES IN PRINCIPAL CITIES

UNMATCHED DEPENDABILITY

THANKS TO BATTERY POWER!

Racks of Gould Planté Batteries are a satisfying sight! You can be sure of complete protection against any emergency today, tomorrow or years from now. Because Planté positive plates are PURE LEAD, required float current is minimized, service life is increased and per annum cost is lowered. Only with this Aristocrat of Stationary Batteries can you get standby power that's unequalled for faithful service . . . year after year dependability.



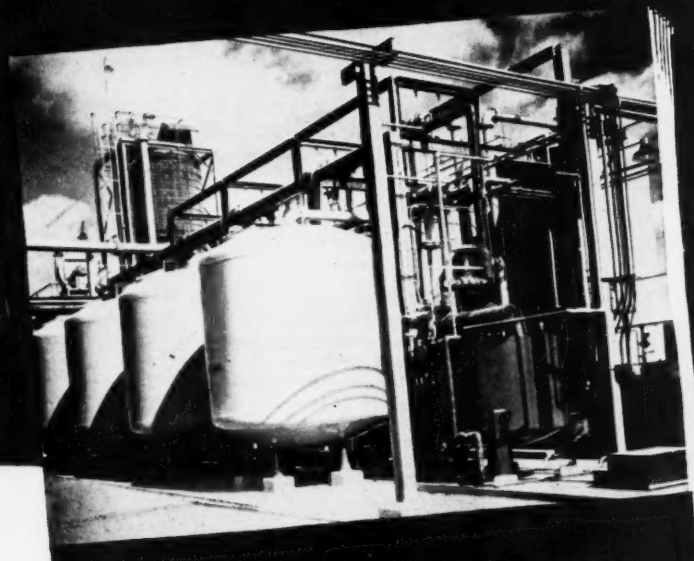
Specify
GOULD PLANTÉ—
The Aristocrat of
Stationary Batteries

GOULD INDUSTRIAL BATTERIES

GOULD-NATIONAL BATTERIES, INC., TRENTON 7, N. J.

Always Use Gould-National Automobile and Truck Batteries

©Gould-National Batteries, Inc.



DEMINERALIZATION
including SILICA REMOVAL
by **PERMUTIT**
ION EXCHANGE

GET THE FACTS

. . . about Permutit Demineralizers for Purer Make-up . . . Lower Cost

You'll want this interesting booklet! Flow diagrams, illustrations and specifications explain key methods of demineralization and silica removal by Permutit ion exchangers and equipment. Write for your free copy —today!

HIGHEST PURITY MAKE-UP Effluents of Permutit Demineralizers have contained *total* electrolytes as low as 0.01 ppm, and silica as low as 0.01 ppm. Under service conditions, values may be slightly higher. In comparison, most distilled water contains 20 to 100 times more electrolytes . . . yet costs much more to produce.

REDUCES B.T.U. COST PER KW-HR The chemical cost for demineralization is usually less than the fuel cost for evaporation of boiler feed make-up. The installed equipment cost for demineralization is also usually less than for evaporation.

ELIMINATES CONDENSATE SHORTAGES A demineralizer is operated independently of the turbine. It may be operated at full capacity if required, even though the turbine is running light and some boilers are standing by idle. It is possible to start boilers of a new plant with demineralized water. The demineralizing system can be placed in operation ahead of the boilers and highest purity make-up prepared for initial starting.

ION EXCHANGERS MEET ALL REQUIREMENTS Choice of units and layout of demineralization and silica removal equipment depend on composition of the water, flow rates, end-use requirements. Permutit makes all types of ion exchange resins and equipment . . . can save you time and money in the specification of the one combination that best fills your needs.

PERMUTIT®

ION EXCHANGE AND WATER CONDITIONING HEADQUARTERS FOR OVER FORTY YEARS

THE PERMUTIT COMPANY, DEPT. EW-5
330 West 42nd Street, New York 36, N. Y.

Please send my copy of "Demineralization including Silica Removal by Permutit Ion Exchangers."

NAME _____ TITLE _____

FIRM _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

In Canada: Permutit Company of Canada Ltd.
6975 Jeanne Mance Street, Montreal

COPE Cable Trough is Used by Utilities and Industrial Plants Throughout the World

The ease and economy of installing standard COPE Cable Trough has given it wide acceptance among the leading utilities and industrial plants around the globe. They realize, as will you, how COPE Cable Trough saves on time, material and costs.

Write for full information.

COPE Cable Trough Installation at Gary Sheet & Tin Mill—U. S. Steel Company

A few of the Users of COPE CABLE TROUGH . . .

Allis-Chalmers Manufacturing Co.
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Atlantic City Electric Co.
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Borg-Warner Corp.
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Carolina Power & Light Co.
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Kaiser Aluminum & Chemical Corp.
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Niagara-Mohawk Power Corp.
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Packard Motor Car Co.
Pennsylvania Electric Co.
Philadelphia Electric Co.
Pittsburgh Plate Glass Co.
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Reynolds Metals Co., Inc.
Southern California Edison Co.
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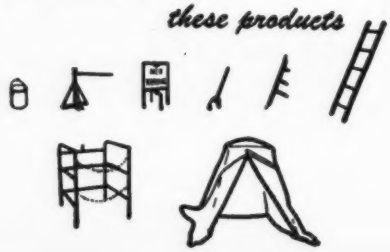
T. J. COPE, INC., 711 SOUTH 50th ST.
PHILADELPHIA 43, PENNSYLVANIA

You know Cope by these products

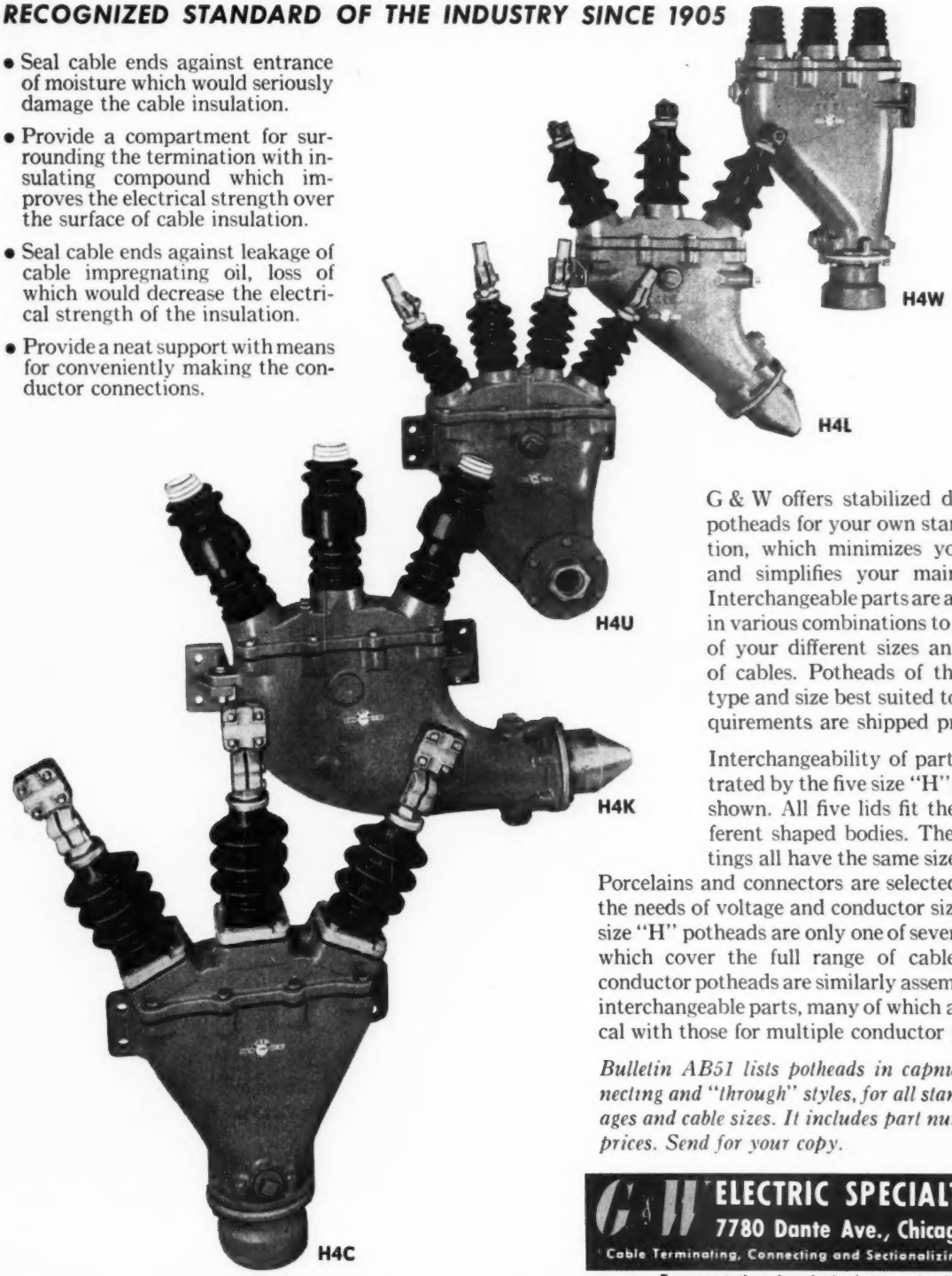


In Canada: Ferranti Company of Canada Ltd.
6975 Jeanne Mance Street, Montreal

G & W Potheads

RECOGNIZED STANDARD OF THE INDUSTRY SINCE 1905

- Seal cable ends against entrance of moisture which would seriously damage the cable insulation.
- Provide a compartment for surrounding the termination with insulating compound which improves the electrical strength over the surface of cable insulation.
- Seal cable ends against leakage of cable impregnating oil, loss of which would decrease the electrical strength of the insulation.
- Provide a neat support with means for conveniently making the conductor connections.



A534

G & W offers stabilized designs of potheads for your own standardization, which minimizes your stock and simplifies your maintenance. Interchangeable parts are assembled in various combinations to take care of your different sizes and ratings of cables. Potheads of the correct type and size best suited to your requirements are shipped promptly.

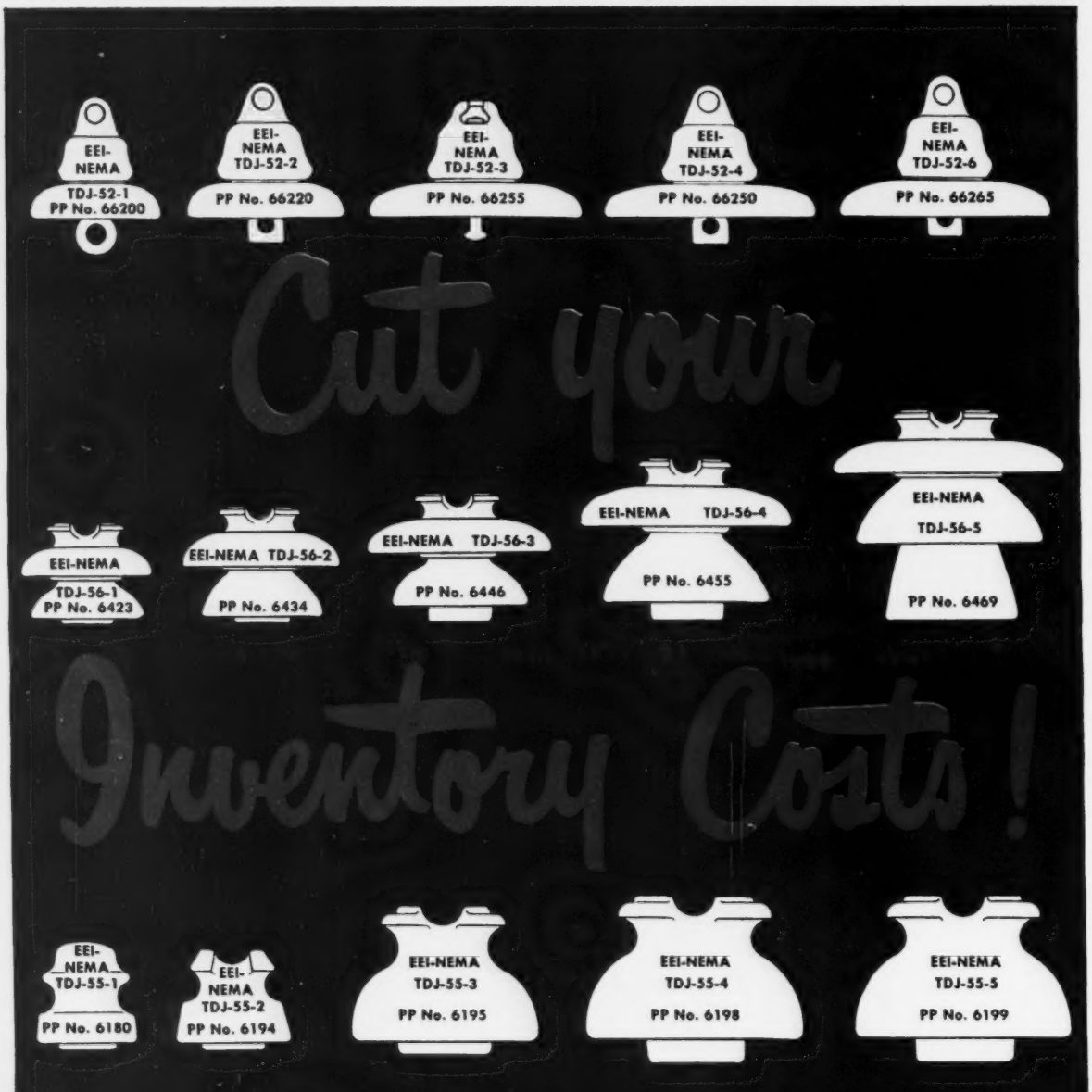
Interchangeability of parts is illustrated by the five size "H" potheads shown. All five lids fit the five different shaped bodies. The base fittings all have the same size 4 flange. Porcelains and connectors are selected to meet the needs of voltage and conductor sizes. These size "H" potheads are only one of several groups which cover the full range of cables. Single conductor potheads are similarly assembled with interchangeable parts, many of which are identical with those for multiple conductor potheads.

Bulletin AB51 lists potheads in capnut, disconnecting and "through" styles, for all standard voltages and cable sizes. It includes part numbers and prices. Send for your copy.

G & W ELECTRIC SPECIALTY CO.
7780 Dante Ave., Chicago 19, Ill.
Cable Terminating, Connecting and Sectionalizing Devices

Representatives in principal cities of U.S.A.
In Canada—Powerlite Devices Ltd., Toronto and Montreal

PORCELAIN PRODUCTS' EEI-NEMA STANDARD INSULATORS


EEI-NEMA TDJ-52-1 PP No. 66200
EEI-NEMA TDJ-52-2 PP No. 66220
EEI-NEMA TDJ-52-3 PP No. 66255
EEI-NEMA TDJ-52-4 PP No. 66250
EEI-NEMA TDJ-52-6 PP No. 66265
Cut your
EEI-NEMA TDJ-56-1 PP No. 6423
EEI-NEMA TDJ-56-2 PP No. 6434
EEI-NEMA TDJ-56-3 PP No. 6446
EEI-NEMA TDJ-56-4 PP No. 6455
EEI-NEMA TDJ-56-5 PP No. 6469
Inventory Costs!
EEI-NEMA TDJ-55-1 PP No. 6180
EEI-NEMA TDJ-55-2 PP No. 6194
EEI-NEMA TDJ-55-3 PP No. 6195
EEI-NEMA TDJ-55-4 PP No. 6198
EEI-NEMA TDJ-55-5 PP No. 6199

You can effect real savings on reducing your inventory, handling costs and record keeping by using the new EEI-NEMA simplified standards on transmission and distribution insulators. We keep your inventory for you! Each of these insulators is in continuous production for prompt shipment. Porcelain Products offers you these insulators in:

1. Superior quality backed by the finest equipment available and quality control standards.
2. Superior workmanship backed by long training and service.
3. Superior design backed by top engineering talent and tests.

Pintype insulators are now produced with larger tie-wire and conductor grooves in accordance with latest standards to accommodate larger size conductors coming into greater use. Ask us for complete details. No obligation.

YOUR INDEPENDENT INSULATOR MFGR.

Porcelain Products, Inc.

PARKERSBURG, WEST VIRGINIA

NOW...

AN IMPORTANT NEW SERVICE TO THE ELECTRICAL INDUSTRY

High-voltage cable pipe processed and Somastic coated to prevent corrosion . . . .

Here are the important features of this new service

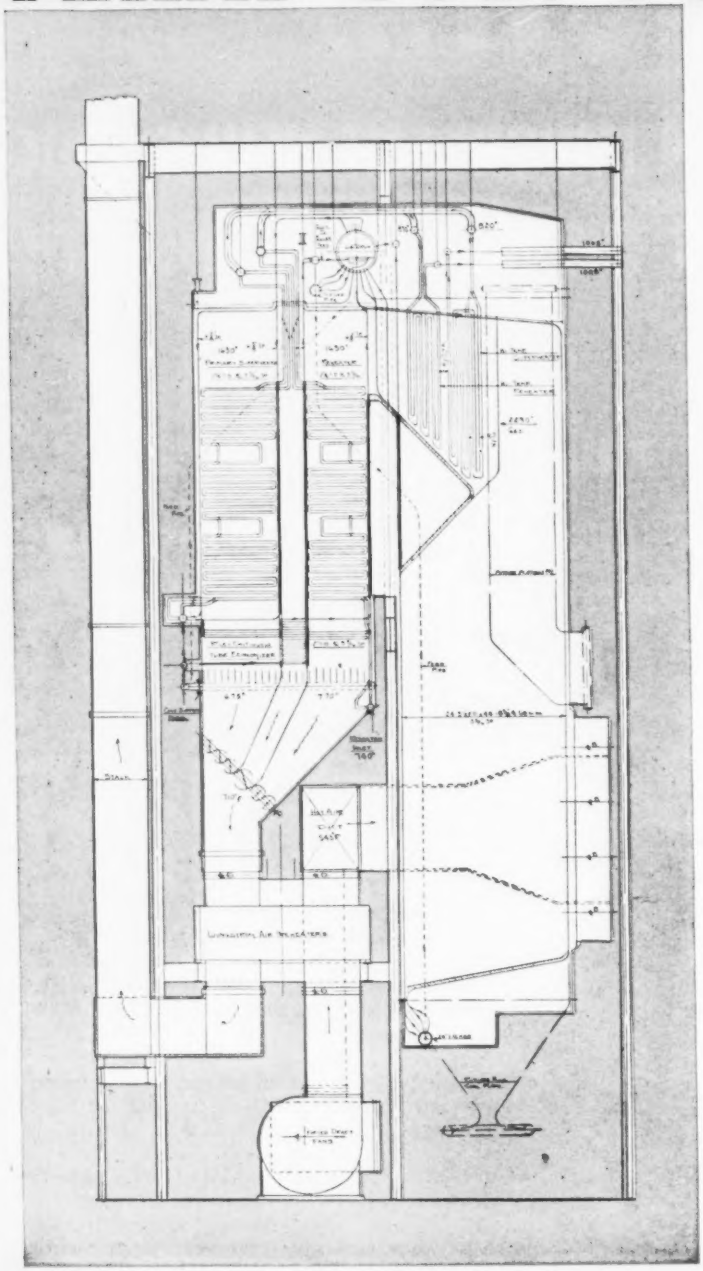
- Internal grit blasting, cleaning and coating of pipe to protect high-voltage cables.
- Special preparation of pipe ends to permit a smooth pull of expensive cable between widely-separated manholes.
- Somastic pipe coating for protection against earth corrosion and electrolysis. (Specified for 96 per cent of high-voltage underground installations.)
- Hevicote applications for giving weight and protection to pipe in marine areas.
- Also, pipe bending, re-conditioning, welding, hydrostatic testing, hauling and stringing.

H. C. Price Co., "America's Foremost Pipeline Constructors," offers a complete cable pipe processing service to the electrical industry. For further information, write or call

H. C. PRICE CO.

PHILADELPHIA ■ BARTLESVILLE, OKLA. ■ NEW ORLEANS

TEXAS GOES FOR RILEY



RILEY REHEAT UNITS
recently purchased by
TEXAS ELECTRIC SERVICE CO.
DALLAS POWER & LIGHT CO.
HOUSTON LIGHTING & POWER CO.

Capacity—1,250,000 lbs./hr.
Design Pressure—2125 psig
Superheater Outlet Pressure—1925 psig
Steam Temperature—1005°F.
Reheater Capacity—1,148,000 lbs./hr.
Reheater Outlet Pressure—470 psig
Reheater Temperature—1005°F.
Efficiency, Gas Firing—83.7 %
Pressurized Furnace
Fired by Gas—Oil Standby
Designed for future conversion to lignite firing
Ebasco Services, Inc., *Engineers*

Method of Steam and Reheat Temperature Control

Steam temperature is maintained constant between 900,000 and 1,250,000 lbs./hr. and reheater temperature between 825,000 and 1,148,000 lbs./hr. by means of gas flow control dampers.

Gas flows over superheater and reheater primary surface are automatically controlled by dampers located below the economizer. This provides definite control of both steam and reheat temperatures. The flow of gases over superheater and reheat surface is proportioned to give the desired temperature of 1005°F. from each.

At high loads where the quantity of gas passing over superheater and reheater surfaces would give higher than desired temperature, part of the gas is by-passed through the open lane between superheater and reheater surfaces. Note that the quantity of economizer surface in the by-pass line is greater to give approximately uniform economizer exit gases.

TRADE MARK Rx REGISTERED

RILEY

STOKER CORPORATION, WORCESTER, MASS.

Boston New York Philadelphia Washington Buffalo Pittsburgh Cleveland Detroit Chicago
Cincinnati Charlotte Atlanta New Orleans St. Louis Kansas City St. Paul Tulsa Houston
Denver Salt Lake City Los Angeles Portland Seattle

BOILERS • PULVERIZERS • BURNERS • STOKERS • SUPERHEATERS • ECONOMIZERS

REHEAT UNITS IN A BIG WAY

★ TEXAS ELECTRIC SERVICES CO.

★ DALLAS POWER & LIGHT CO.

★ HOUSTON LIGHTING & POWER CO.

all have recently ordered 1,250,000 lbs./hr., 2125 design pressure, 1005°F. steam temperature and 1005°F. reheat temperature Riley steam generating units. These will be the first gas-fired reheat units to be installed in Texas.

While the Riley units purchased by Texas Electric Service Company and Dallas Power and Light Company are the first Riley units ordered by these companies, the two 1,250,000 lbs./hr. Riley reheat units purchased by Houston Lighting and Power Company will be the tenth and eleventh Riley units installed by them since 1938 and will give Houston over 7,000,000 pounds per hour capacity of Riley units.

When such a large public utility company places ten different orders with Riley extending over a 15-year period, isn't that conclusive evidence that Riley is a good company to do business with, that the performance of Riley equipment has been entirely satisfactory and that Riley gives their customers their money's worth.

It will pay you to investigate Riley equipment and request a Riley proposal when you are considering steam generating or fuel burning equipment. Riley users will assure you that you can rely on Riley.

Other Riley Public Utility Installations

DEPARTMENT OF WATER AND POWER
CITY OF LOS ANGELES, CALIFORNIA
1,200,000 lbs./hr. 2075 psig. 1000°F. and 1000°F. reheat.

LOUISIANA POWER & LIGHT CO.
1,000,000 lbs./hr. 1725 psig, 1005°F. and 1005°F. reheat.
Ebasco Services, *Engineers*

SOUTHWESTERN GAS & ELECTRIC CO.
630,000 lbs./hr. 1050 psig, 1005°F.
Sargent & Lundy, *Engineers*

MONONGAHELA POWER CO.
700,000 lbs./hr. 1050 psig, 905°F.
Sanderson & Porter, *Engineers*

UTAH POWER & LIGHT CO.
575,000 lbs./hr. 1700 psig, 1000°F. and 1000°F. reheat.
Bechtel Corp., *Engineers*

CENTRAL ILLINOIS LIGHT CO.
600,000 lbs./hr. 950 psig, 900°F.
Commonwealth Services, *Engineers*

NORTHERN STATES POWER CO.
385,000 lbs./hr. 1500 psig, 950°F.
Pioneer Service & Engineering, *Engineer*

SOUTH CAROLINA PUBLIC SERVICE AUTHORITY
460,000 lbs./hr. 1025 psig, 900°F.
Ford, Bacon & Davis, *Engineers*

THE POTOMAC EDISON CO.
700,000 lbs./hr. 1050 psig, 905°F.
Sanderson & Porter, *Engineers*

IOWA ELECTRIC LIGHT & POWER CO.
300,000 lbs./hr. 975 psig, 910°F.

GULF POWER CO.
325,000 lbs./hr. 1000 psig, 900°F.
Southern Services, *Engineers*

SOUTH CAROLINA GAS & ELECTRIC CO.
400,000 lbs./hr. 1475 psig, 955°F.
Gilbert Associates, *Engineers*

UTAH POWER & LIGHT CO.
620,000 lbs./hr. 1500 psig, 955°F.
Bechtel Corp., *Engineers*

IOWA-ILLINOIS GAS & ELECTRIC CO.
250,000 lbs./hr. 975 psig, 905°F.

PUBLIC SERVICE CO. OF INDIANA
400,000 lbs./hr. 1000 psig, 910°F.
Sargent & Lundy, *Engineers*

DEPARTMENT OF WATER AND POWER
CITY OF LOS ANGELES, CALIFORNIA
825,000 lbs./hr. 1200 psig, 900°F.

ARKANSAS POWER AND LIGHT CO.
650,000 lbs./hr. 1050 psig, 905°F.
Ebasco Services, Inc., *Engineers*

UNION ELECTRIC CO. OF ILLINOIS
370,000 lbs./hr. 1000 psig, 905°F.

SOUTHWESTERN PUBLIC SERVICE CO.
330,000 lbs./hr. 1050 psig, 900°F.

CAROLINA POWER AND LIGHT CO.
330,000 lbs./hr. 1025 psig, 905°F.
Ebasco Services, Inc., *Engineers*

PENNSYLVANIA ELECTRIC CO.
300,000 lbs./hr. 975 psig, 900°F.
Burns-Roe, *Engineers*

OHIO EDISON CO.
225,000 lbs./hr. 925 psig, 900°F.
Commonwealth Services, *Engineers*

MISSISSIPPI POWER CO.
230,000 lbs./hr. 975 psig, 860°F.
Southern Services, *Engineers*

WEST PENN POWER CO.
210,000 lbs./hr. 1000 psig, 910°F.
Sanderson & Porter, *Engineers*

INTERSTATE POWER CO.
200,000 lbs./hr. 725 psig, 910°F.
Sargent & Lundy, *Engineers*

A survey of your Power Plant by a consulting engineer will possibly show ways of making surprisingly large savings in your power costs

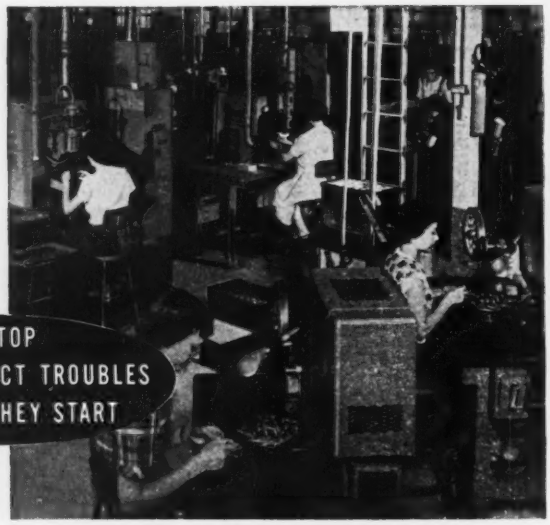
COMPLETE STEAM GENERATING UNITS

. . . it will pay you to visit modern Riley Installations before purchasing Boiler or Fuel Burning Equipment

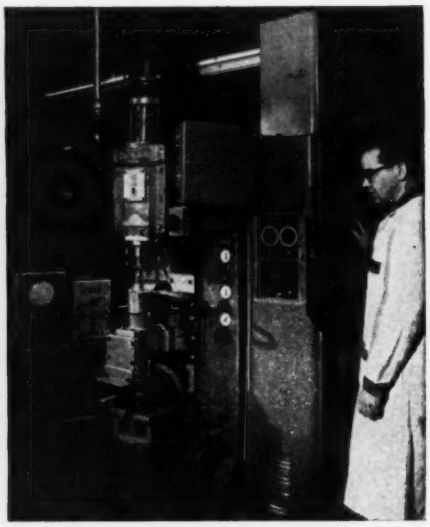
WATER-COOLED FURNACES • STEEL-CLAD INSULATED SETTINGS • AIR HEATERS

What a Combination!

For better contact assemblies . . . EXPERIENCE—35 years . . . FACILITIES—include complete resistance welding equipment.



These resistance welders occupy a part of 100,000 feet of floor space devoted to contact production.



Resistance welding machine in the Mallory Contact Engineering Laboratory.

The complete facilities for making contact assemblies at Mallory include spot, projection, tape and point welding machines . . . as well as five types of brazing equipment. Thus, Mallory engineers are unrestricted in their choice of the one best assembly method to fit your particular needs.

When you bring your contact problems to Mallory, you get the advantage of an unequalled source of data and experience in resistance welding techniques . . . another important factor that assures precision and uniformity for the contacts in your products.

A complete range of contact materials and production methods results in lower cost contacts produced to your requirements.

For complete information, write us today. Our engineers will be glad to study your requirements . . . answer your questions.

Expect more . . .
***Get more from* MALLORY**

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Electrical Contacts and Contact Assemblies

P.R. MALLORY & CO. Inc.
MALLORY

SERVING INDUSTRY WITH THESE PRODUCTS:
Electromechanical—Resistors • Switches • Television Tuners • Vibrators
Electrochemical—Capacitors • Rectifiers • Mercury Batteries
Metallurgical—Contacts • Special Metals and Ceramics • Welding Materials

P. R. MALLORY & CO. INC., INDIANAPOLIS 6, INDIANA

"For High-Accuracy, Long-Life Resistors we wind with D-H Electrical Alloy Wire"

...so states INSTRUMENT RESISTORS COMPANY, of Union, New Jersey, manufacturers of IN-RES-CO quality-built resistors for every electrical and electronic application

IN-RES-CO resistors are wound to meet the most critical requirements without excessive cost; standard inductive and non-inductive units are available in resistance ranges from 0.01 ohm to several megohms—with power ratings from a fraction of a watt to 10 watts. Included, are types especially suited to counter excessive humidity, fungus, space limitations, and temperature rise.

Says Instrument Resistors Company: "For 23 years, we have devoted our facilities exclusively to the development and manufacture of quality resistance components. The fact that today, with such a wealth of experience to our credit, we specify Nichrome, Karma, and D-H Manganin wire for windings, constitutes the strongest endorsement we can offer of these Driver-Harris products."

Nichrome*, Karma*, and D-H Manganin deliver top-level performance—their characteristic electrical and physical properties remaining unchanged even under exceptionally exacting operating conditions. They are ready to go to work for *you*, too—as are more than 80 other Driver-Harris alloys. Profit by consulting with us. We shall be glad to make recommendations based on your particular needs . . . and are confident we can meet your resistance requirements with D-H alloys that will assure the best possible results.

Nichrome and KARMA are produced only by

Driver-Harris Company

HARRISON, NEW JERSEY

BRANCHES: Chicago, Detroit, Cleveland, Los Angeles, San Francisco

In Canada: The B. GREENING WIRE COMPANY, Ltd., Hamilton, Ontario.

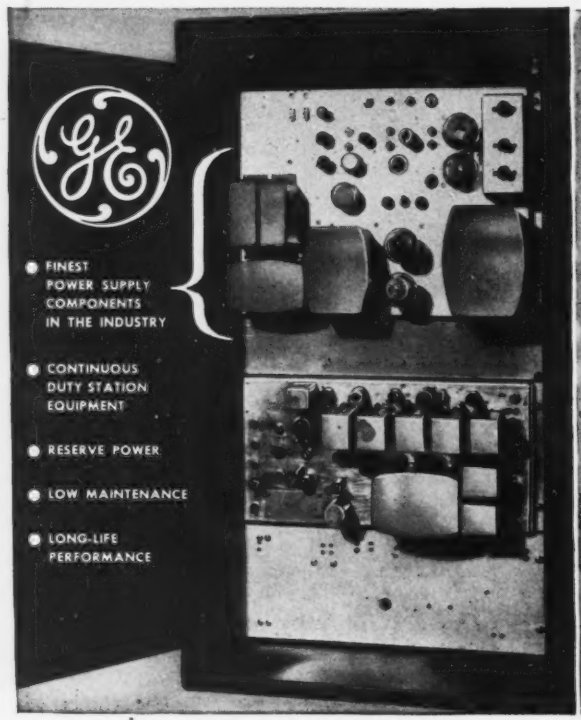
*T.M. Reg. U. S. Pat. Off.

MAKERS OF THE MOST COMPLETE LINE OF ELECTRIC HEATING, RESISTANCE, AND ELECTRONIC ALLOYS IN THE WORLD

ONLY G-E GIVES YOU...

24 hour duty

2-WAY RADIO EQUIPMENT



SINGLE PACKAGE MOBILE UNIT . . . Combines both receiver and transmitter chassis. For complete details call the local CAS* man or write: *General Electric Co., Sec. 1953-18, Electronics Park, Syracuse, N.Y.*

** Communications Advisory Service*

1878 75 1953 YEARS OF ELECTRICAL PROGRESS

Only with G-E 2-way station equipment could you *actually* hold the button down for *24 hours* of continuous transmission and confidently know that *nothing will burn out.* Here's further proof of rugged G-E design and construction that provides dependable service in any emergency . . . *built-in reserve performance* to meet the demands imposed by today's public utility expansion.

Replace with G-E and get radio equipment designed for your industry! General Electric, who pioneered in split-channel development, offers low or high band units with *power to spare* for long-life performance . . . maintenance economy. These outstanding 2-way radio features explain why *the trend is to G-E communications equipment!*

Follow the trend . . . replace with G-E!

GENERAL ELECTRIC

C-D-F INSULATING TAPES

Uniform strength and quality plus prompt deliveries!

C-D-F SILICONE TAPES for A.I.E.E. Class H Electrical Insulation. Available in Varnished Fiberglas cloth and Silicone Rubber-coated Fiberglas cloth. Resistant to high temperatures; high dielectric strength, low dielectric losses, excellent moisture resistance and high tensile strength. They resist mild alkalis, non-oxidizing acids, mineral oils, oxygenated solvents. Available in a range of sizes on continuous rolls. Write for Technical Bulletin #47.

C-D-F TAPES OF TEFLON* have the desired mechanical and electrical properties for heavy-duty motor, generator, and conductor insulation. Unaffected by temperature fluctuations, exposure to oils and greases, or weather conditions. Fiberglas supported and unsupported Teflon tapes are available in a range of sizes.

*du Pont trademarks.

C-D-F MICABOND TAPES have an inherently high and permanent resistance to heat with good dielectric properties. Micabond Tapes are used for insulating motor and generator armature and field coils, turbo-generator coils, and many similar applications where flexible high quality insulation of A.I.E.E. Classes B and H insulators are required. Available in a wide range of sizes with many different backings including: fiberglas, silk, cellophane, cotton, paper, and Mylar*.

If you have an insulating problem, probably a C-D-F product is the answer. C-D-F manufactures and fabricates electrical insulation, laminated and molded plastics. Sales offices are located in principal cities. Call your C-D-F sales engineer—he's a good man to know!

THE NAME TO REMEMBER... C-D-F **SILICONE; TEFLON; MICABOND TAPES**

Continental-Diamond Fibre Company

NEWARK 15, DELAWARE

Nicopress
SUSPENSION
DEAD END
1 Faster
2 Neat streamline job when completed
3 Can be made with the same tool used in making a regular line splice
4 The exclusive features found in this Dead End make it possible for it to withstand the most severe conditions
5 Dead Ends are available for Copper, Copperweld and Steel

The National Telephone Supply Company

5100 SUPERIOR AVENUE • CLEVELAND 3, OHIO

Canadian Mfr.: N. SLATER CO., LTD., HAMILTON, ONTARIO, CANADA

Export Distributor: INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

STOP WASTING MONEY BY THE TRUCKLOAD

Go White!

YOU NEED the most efficient kind of delivery trucks for today's operating conditions.

That's why so many leading firms say "Go White" for today's finest kind of delivery service.

Tailored to the exact needs of your business for more deliveries per day . . . lower cost per unit delivered . . . the new Whites save time and cut costs in every phase of delivery service.

Find out how the exclusive advantages of the White 3000 pay off first day in service . . . and for years. See your White Representative for facts.

THE WHITE MOTOR COMPANY
Cleveland 1, Ohio

White 3000

For more than 50 years the greatest name in trucks

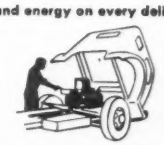
LOW-BED FRAME DESIGN

Saves reaching, stretching and straining

CAB SAVES STEPS

Driver saves time and energy on every delivery

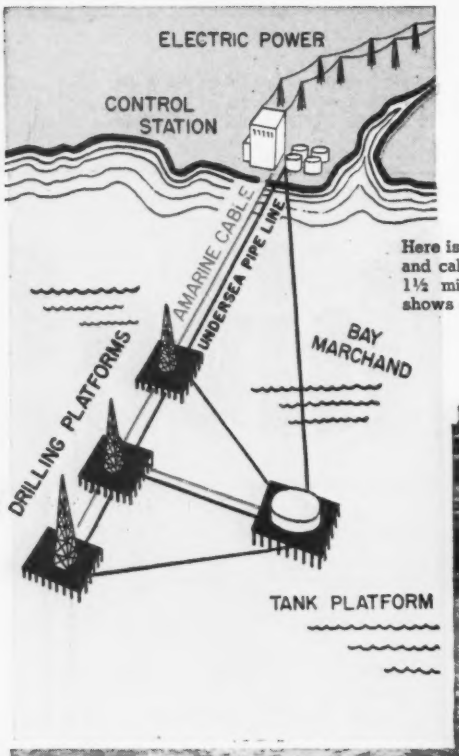
EXCLUSIVE POWER-LIFT CAB



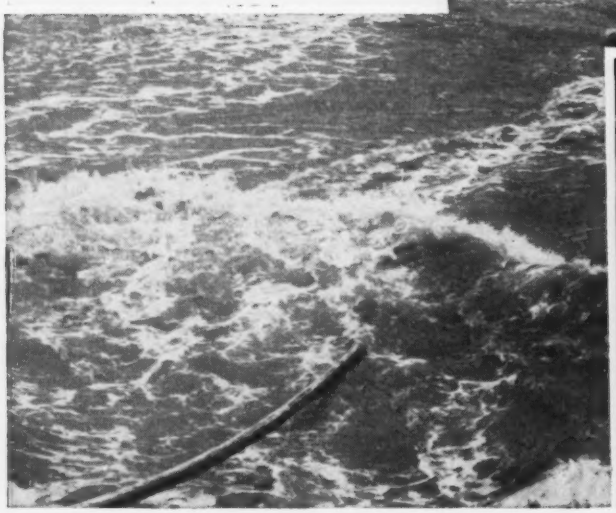
Saves inspection and maintenance time and cost

Here is a White 3000 being operated by Ohio Edison Company to install and service light and power underground cable and construction. Outstanding maneuverability of the White makes it ideal for all utility services.

The first case 4 miles of powers



Here is layout of drilling platform and cable supply. Rig D is about 1½ miles from shore. Red line shows cable connections.



Anchoring cable on shore. Power is supplied at 13,800 volts. Entire cable is armored with galvanized mild steel wire to provide strength, resist abrasion.

Pulling cable onto first platform. Each of the three conductors is covered with PS Shielding to eliminate corona discharge.

AMERICAN STEEL & WIRE DIVISION
USS TRADE MARKS
AMERICAN ELECTRICAL WIRE AND CABLE
UNITED STATES STEEL

A STANDARD CABLE FOR

▼ asbestos wire and cable ▼ shovel & dredge cable
▼ paper & varnished cambric cable
▼ aerial, underground & submarine cable

U·S·S AMERICAN ELECTRICAL

of its kind...
Amarine Submarine Cable off-shore drilling rig

• It isn't easy to operate an off-shore drilling rig in the Gulf of Mexico. Fog, northwesters and water spouts are common hazards. Hurricanes are the worst of all.

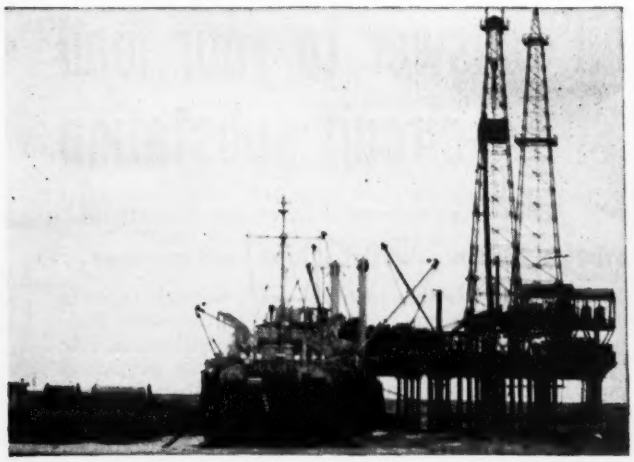
In the face of these difficulties, the California Company brought in 10 producing wells a mile or more from shore. A converted LST supplied power to the pumps—but it was vulnerable to bad weather and it was needed elsewhere, for other drilling operations. What was needed was a *reliable* way to get commercial power out to sea.

American Steel & Wire designed a special non-leaded 3-conductor submarine cable that transmits some 2,500 horsepower to the drilling platforms. In just a single day, it was carried out to the first platform. It is totally unsupported, and lies on the bottom of the Gulf, safe from wind and sea. Now the pumps are operated round the clock with reliable shore power.

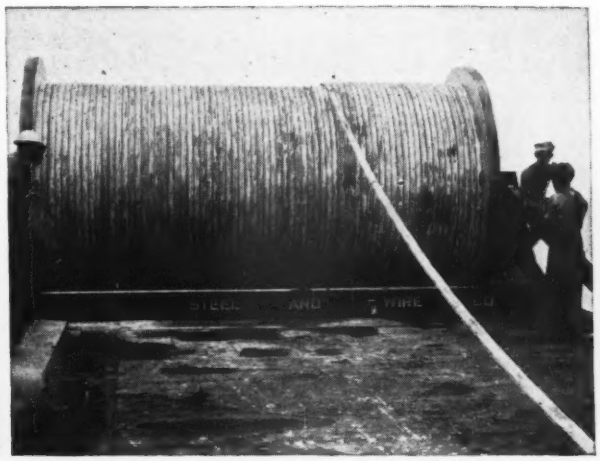
It's the tough jobs like this that have made U·S·S Amarine Submarine Cable famous. And remember, too, that you can get a standard U·S·S American cable for every special job, whether it's for a mining locomotive, dredge, power shovel or a hand-operated electric drill.

AMERICAN STEEL & WIRE DIVISION
UNITED STATES STEEL CORPORATION
GENERAL OFFICES: CLEVELAND, OHIO

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



Here is typical rig. Notice LST in center, cable barge at left. Cable contains three pairs of telephone wires to communicate between drilling rigs and shore.



Cable was shipped on two reels—12,970 feet on one, 6,500 on the other. We have shipped another 6,000 feet of same cable to join new drilling rigs.

EVERY SPECIAL JOB!

▼ mold cured portable cord
▼ machine tool & building wire
▼ special purpose wire & cable

WIRE & CABLE USS

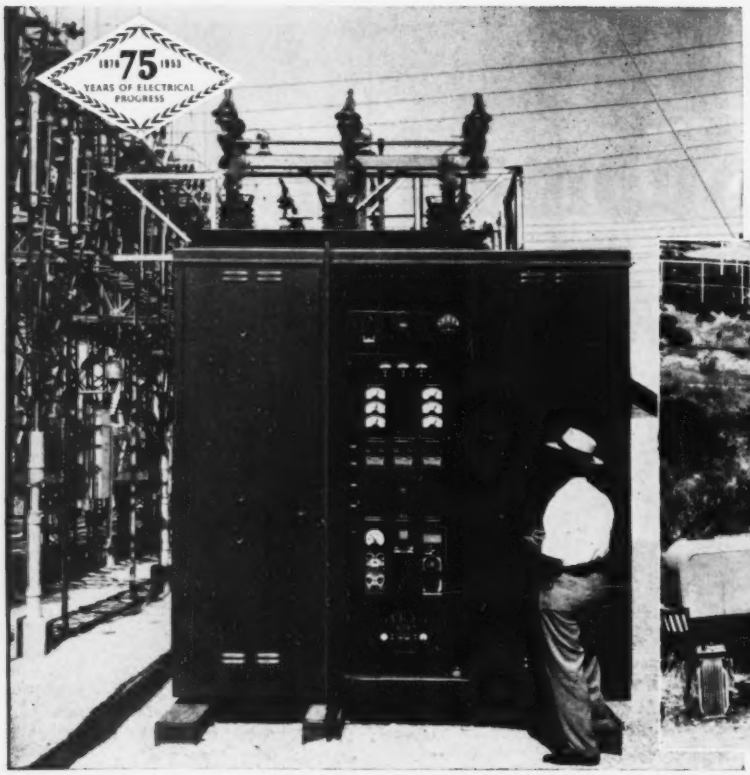
SEND THE COUPON

American Steel & Wire Division
Room EE-53, Rockefeller Building, Cleveland 13, Ohio

☐ Please give me more information on U·S·S Amarine Submarine Cable.
☐ Have representative call.

Name.....
Title.....
Company.....
Address.....
City.....State.....

UNITED STATES STEEL



A 1500-kva General Electric single-circuit integral unit substation. The control and metering compartment is being inspected by the worker.

Installing a G-E single-circuit unit substation at a West Coast utility. This substation replaced old power transformers and was in service the same day it arrived.

Here's a flexible, "packaged" answer to your load growth problems...a G-E single-circuit substation

for suburban areas, new developments, temporary or seasonal loads, or for small industrial loads, this integral-type unit substation is the practical, low-cost answer.

General Electric completely "packaged" unit substations incorporate transformer, vertical-lift magneblast air circuit breaker, load-ratio control and control panel with voltage regulating relay and line-drop compensator, switches and other necessary instruments in a single, fully co-ordinated enclosure. They are most widely used in areas of light-load-density, for radial feed. Units are compact and require little installation space. They present an attractive appearance and may be installed in residential areas, near the load center.

High re-use value. If your load problems are temporary or seasonal, or if the load shifts, the G-E unit substation may easily be relocated to meet your requirements. Installation is simple—many jobs are in service within a single day.

Low and predictable installed cost, because there is nothing else to buy . . . nothing to overlook. Purchasing is simplified . . . only one specification, one purchase transaction. Repeat orders can be placed without further engineering or specification writing.

Ratings available. G-E single-circuit unit substations are furnished in ratings from 12 to 66 kv incoming voltage. They have widest application in light-load-density areas where a single 2.5- or 4.33-kv feeder with 1000 to 3000 kva of load is to be served or in the 15-kv class for loads of 1000 to 5000 kva.

If you are faced with load-growth problems, look into G-E single-circuit integral unit substations. For full information get in touch with your General Electric sales representative, or write to Section 422-4, General Electric Company, Schenectady 5, N. Y.

You can put your confidence in—

GENERAL ELECTRIC

to make wood *LAST*

treat it with PENTA

***Long Life** is assured for the 20,000 board feet of laminated fir in this substation built by the Municipal Electric Company, Kirkwood, Mo. Builder had all wood pressure-treated to 6# net retention with penta-in-oil solution, increasing by many times the normal life of the structure.*

in substations, for example . . .

Exposed wood in any structure is subject to attack by rot and insects from the date of construction.

One simple requirement in the specs — *pressure-treat it with penta*—will extend the service life of wood members many times the normal span.

Technical Data on penta and its many applications are contained in this book, titled "Specify Penta." For your copy, write: MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 800 North Twelfth Blvd., St. Louis 1, Missouri.

3 REASONS FOR PRESSURE-TREATING WOOD WITH MONSANTO PENTA:

1 **Clean Treatment.** Proper treatment with penta will leave surfaces clean and nonbleeding—paintable, if specified.

2 **Double Protection.** Penta treatment prevents both decay and insect attack for years, thereby reducing maintenance problems and costs.

3 **Lasting Protection.** Monsanto Penta, forced deep into the cells of wood, stays there. Rain or ground water will not wash it out.

PENTA

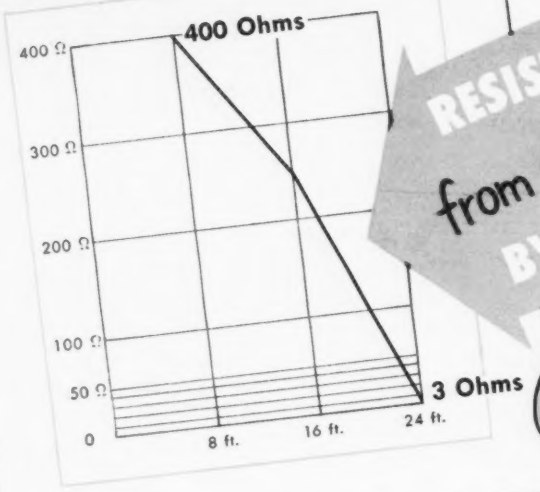
Engineering: James R. Kearney Corporation, St. Louis
Laminated Wood: Rilco Laminated Products, Inc., St. Paul, Minn.

SERVING INDUSTRY... MONSANTO CHEMICALS – PLASTICS **WHICH SERVES MANKIND**

DEEP GROUNDING

—the simple, low-cost method to get TOP PERFORMANCE AND SAFETY from your Protective Equipment

In Corpus Christi, Texas . . .



RESISTANCE LOWERED from 400 to 3 Ohms BY DEEP GROUNDING

with

Copperweld TRADE MARK SECTIONAL GROUND RODS

To insure better line performance, greater safety and maximum protection against costly outages, low resistance ground connections are a must. It's a fact that in most localities, good conducting soils are found only at a considerable depth below the surface. For example, in Corpus Christi, Texas, an 8-ft. ground rod showed a resistance of 400 ohms, which, of course, can hardly be called a ground. But, when additional sections of Copperweld* Ground Rods were added to reach a depth of 24 feet, the resistance dropped to 3 ohms. Quite a difference!

Time after time, deep grounding with Copperweld Sectional Ground Rods has proved to be the most economical way to reach the strata of low resistance. With Copperweld Sectional Ground Rods, you get permanent protection that multiplies the effectiveness of your lightning arresters, over-voltage protectors and overhead ground wires.

Copperweld Sectional Ground Rods have a stiff steel core to provide the rugged strength for easy driving. This core is permanently protected from corrosion by a thick, molten-welded layer of copper having high conductivity. No other ground rod has this inseparable molten-weld which eliminates the possibility of electrolytic action.

If you want to reduce outages and insure greater revenue through continuity of service, use Copperweld Sectional Ground Rods and drive them down to "pay dirt."

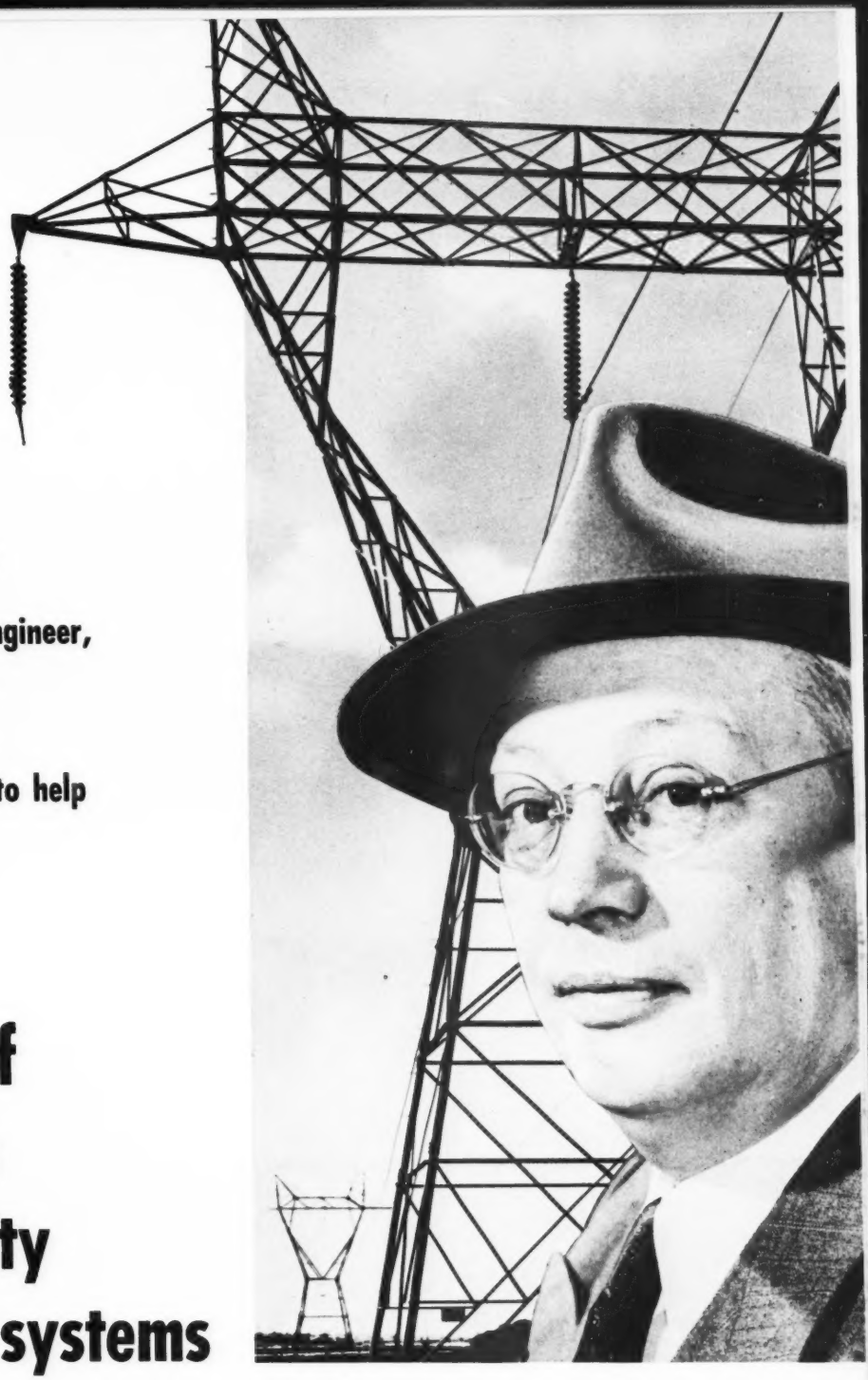
*Trade Mark

Any of these Copperweld Sectional Rods may be used as a top, intermediate, or bottom section. They are roll-threaded on both ends.

As each Copperweld Sectional Ground Rod is driven, the next rod is joined to it by means of a heavy bronze coupling, and the driving procedure is then repeated.

THEY'RE MOLTEN-WELDED Copperweld GROUND RODS

COPPERWELD STEEL COMPANY
Glassport, Pa.
SALES OFFICES IN PRINCIPAL CITIES

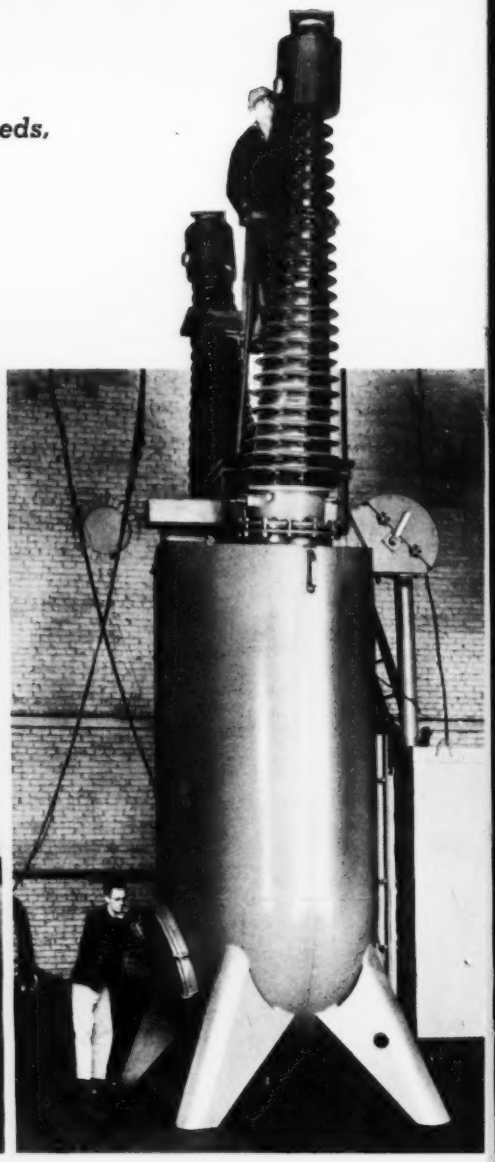


Meet C. F. Wagner,*
Westinghouse Consulting Engineer, who will give you, on the following pages, a highly informative tour designed to help you in the . . .

Application of equipment in higher capacity transmission systems

*Charlie Wagner, 1952 winner of the Edison Medal for his "distinguished contribution in the field of power system engineering", has spent over thirty years in the field of transmission engineering and insulation coordination — both in this country and abroad. He and other experts on the Westinghouse Utility team present some important facts.

"Power breakers are crucial in transmission expansions. Dr. W. M. Leeds, Manager, Power Circuit Breaker Development, explains . . ."



How we keep breaker capacity ahead of your transmission requirements

Higher concentrations of power — greater flexibility of system operation — higher transmission voltages — are possible only because of higher capacity breakers. To date, the power circuit breaker has not been a limiting factor in transmission system design. We don't think it will be because the High Power Laboratory enables us to keep up with your farsighted transmission system designers.

Early this year, we announced "Big Ben", the world's largest breaker, with 25,000 mva interrupting capacity at 330 kv. "Big Ben" takes its place beside a whole array of high-capacity breakers: 15,000 mva, 230 kv; 10,000 mva, 161 kv; 10,000 mva, 138 kv; 3500 mva, 69 kv frame mounted; 2500 mva, 34.5 kv; and 2000 mva, 18 kv.

Some of these represent high-current interrupting problems, others high-voltage interrupting problems. The solutions to both have been demonstrated in the High Power Laboratory.

YOU CAN BE **SURE**...IF IT'S

"Westinghouse can build breakers to meet every transmission need"

These design factors boost breaker capacity

Here are some of the specific factors that enable us to meet your demands. First, the "De-ion®" grid. Heavy current arcs generate high-pressure oil jets that blast the arc out. Light current arcs are interrupted by mechanically induced oil flow. All ratings of current are completely interrupted within 3 cycles. But the oil and gas forces are balanced so that high stresses don't react on the bushing or shift contact alignment.

Breakers 230 kv and larger are of the Watchcase* design using the proven dead-tank construction. Oil content is reduced to less than one-half that of the conventional round-tank design. This shape is possible only because the De-ion grids keep the tank pressures low during interruption.

Surge suppressor tanks — air cushions — are used on all 10,000,000-kva, round-tank breakers. These absorb pressure shocks, reduce impact and eliminate rebound.

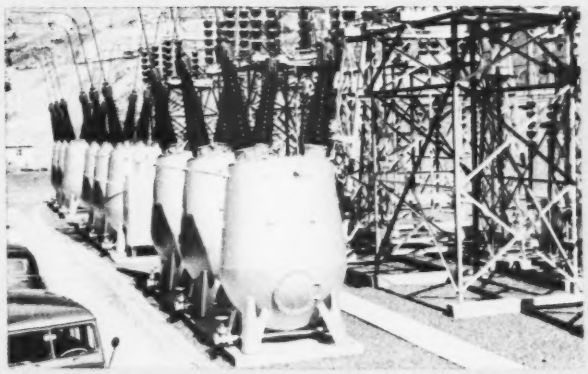
Operating mechanisms have also kept pace. A single AA-7, AA-10 or AA-14 pneumatic operating mechanism operates all three poles of a breaker, simultaneously. All are mechanically trip free to insure fast parting of contacts under any condition of opening, yet permit reclosing as fast as your system requires.

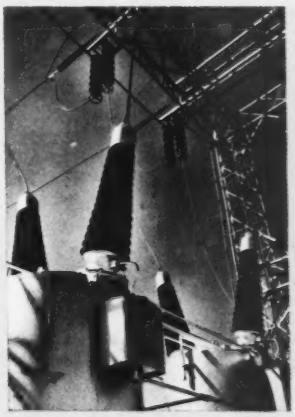
The condenser bushing, using the sound electrical principle of capacitance voltage division, insures long-life, corona-free and radio-interference-free operation at all voltages.

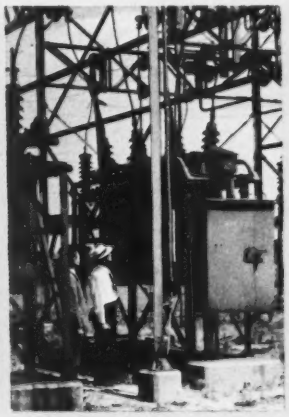
And best of all, most older breakers can be modernized for higher capacity at a fraction of the cost of new breakers.

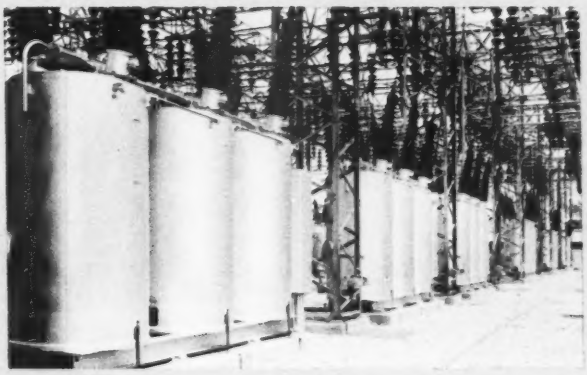
Keep close to Westinghouse for today's or future breaker requirements. Write for descriptive booklets — B-4662, B-3462, DB-33-805 and DB-33-820. J-60826

*Trade-Mark



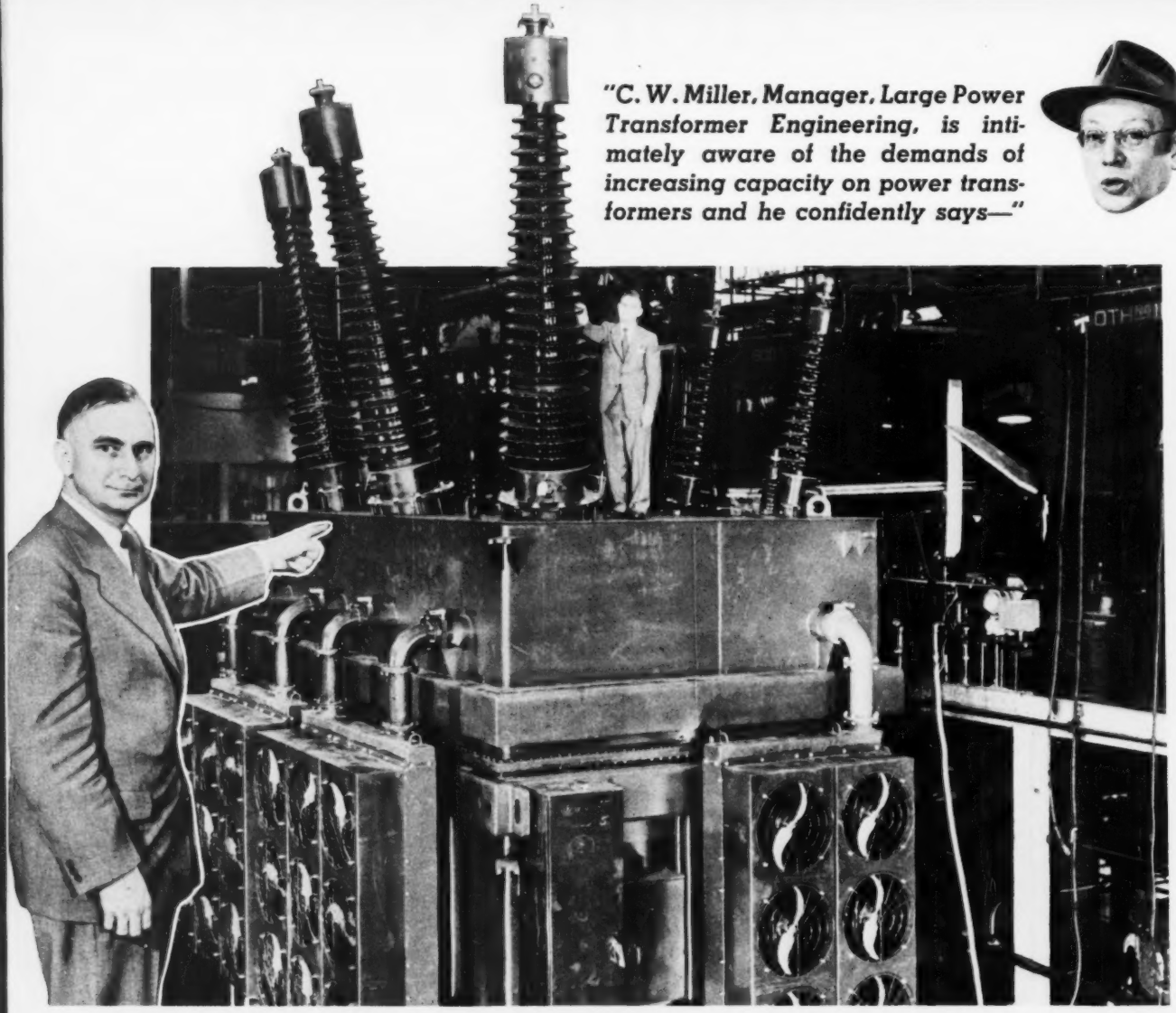






Westinghouse

"C. W. Miller, Manager, Large Power Transformer Engineering, is intimately aware of the demands of increasing capacity on power transformers and he confidently says—"



Westinghouse Form-Fit design is your answer to higher capacity transmission problems

As the need for higher and higher transmission capacities develops, there's only one practical transformer answer: larger and larger single-unit, Form-Fit power transformers.

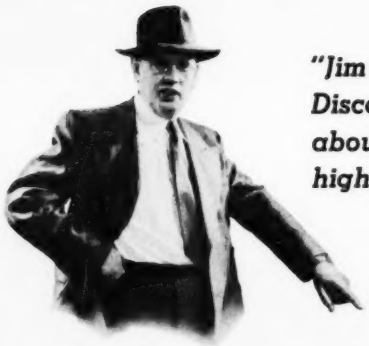
Why? Because the Form-Fit design can handle larger blocks of power in a smaller and lighter unit than any other known form of construction.

The barrier to higher rated transformers is, of course, transportation limitations. But consider this: The largest rating yet built, 190,000 kva; the highest commercial voltage rating yet built, 330 kv (illustrated); the highest voltage test units in existence, 500 kv, are *all* of Westinghouse Form-Fit design. Even now, units of over 300,000 kva are feasible and the end is nowhere in sight.

The inherently superior mechanical, thermal and dielectric characteristics of the Form-Fit design always result in reduced size and weight, plus the utmost in reliability. What are your requirements? For additional information on Westinghouse Power Transformers write for booklet B-4142-A.

J-70692

YOU CAN BE **SURE**...IF IT'S



"Jim Owens, Supervising Engineer, Disconnecting Switch Section, tells about a major new development for high-capacity lines . . ."

On test: giant new disconnects for 330-kv systems

Mammoth switch is built like its smaller brothers in Westinghouse Type-V line

This is one of the world's biggest disconnects. It will be installed on a 330-kv line — a milestone in high-capacity transmission systems.

With the ultra-high voltage and capacity, these switches had to meet rigid performance standards. But the basic Westinghouse Type-V design, used from 7.5 to 330 kv, proved satisfactory. See why this is so.

Consider corona, a big problem at high voltages. In the Type-V design, the streamlined housing *completely* covers the entire blade-actuating mechanism — eliminating a possible source of corona with hinge end shielding.

This giant switch has only three moving parts on the live side — an exclusive Westinghouse Disconnect feature. Moreover, there is no flexible shunt to wear out or rust away. And there is this major point for those who do not like to get close to one third of a million volts: all bearings, including those on live parts, are lubricated for life.

These switches have shown up superbly in exhaustive tests at our High Voltage and High Power Laboratories at Trafford and East Pittsburgh, Pennsylvania. We urge you to investigate the Type-V line. Write now for booklet B-4241.

J-60827

Westinghouse

"Accuracy is the watchword of Bob Hurst, Manager, Instrument Transformer Section, and he has a good reason why — "

Transmission trends demand the accuracy of Westinghouse Transformers

When voltage goes up, accuracy in current and potential transformers becomes increasingly important. Inaccuracies in metering and relaying equipment could be costly to your operations at any level. At higher voltages, it becomes even more serious. That's why Westinghouse devotes so much time to designing and building instrument transformers of highest accuracy.

An important feature contributing toward high accuracy is the use of finest quality, grain-oriented Hipersil® steel cores. They have high permeability with low losses and exciting current, factors essential for high accuracy.

Such added Westinghouse design features as oxygen-free copper, highest quality coordinated insulation, sealed oil-filled bushings for an absolute airtight construction make Westinghouse High-Voltage Instrument Transformers the best and most accurate on the market.

So when you're confronted with the need to add capacity to your transmission lines, be sure to investigate Westinghouse Instrument Transformers. Their outstanding accuracy will pay dividends in increased reliability of your metering and relaying operations. For more details contact your Westinghouse Representative. J-70693

YOU CAN BE **SURE**...IF IT'S

"Microwave communication and control have many advantages to offer Utilities. Here's Bob Cheek, Assistant Manager of Application Engineering at our Electronic Division, to tell you about them."

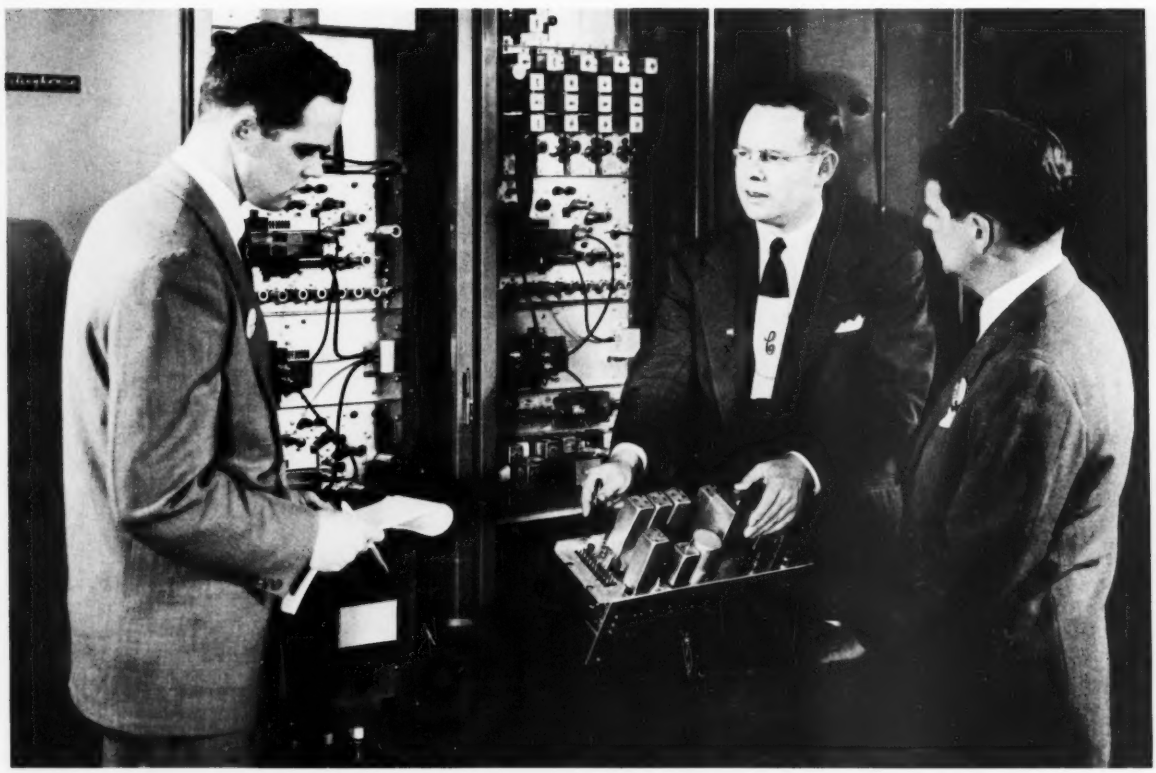
Westinghouse 2000 MC Microwave provides fast, reliable communication and control

As capacity on transmission lines increases, it becomes more and more essential that communication and control be fast and reliable under all conditions. Westinghouse 2000 MC Microwave provides up to 30 voice or 450 telegraphic channels for this necessary speed and reliability.

Electric Utility needs prompted the practical design and system features of Westinghouse 2000 MC Microwave. The multiplexing equipment, of the frequency division type, affords full flexibility of the voice and telegraphic channels. This system works with all types of interconnected equipment, such as relaying, telemetering and supervisory control devices.

Since Westinghouse builds both microwave and power line carrier systems and the end-use equipment which utilizes these systems, we are in a position to give you unbiased recommendations.

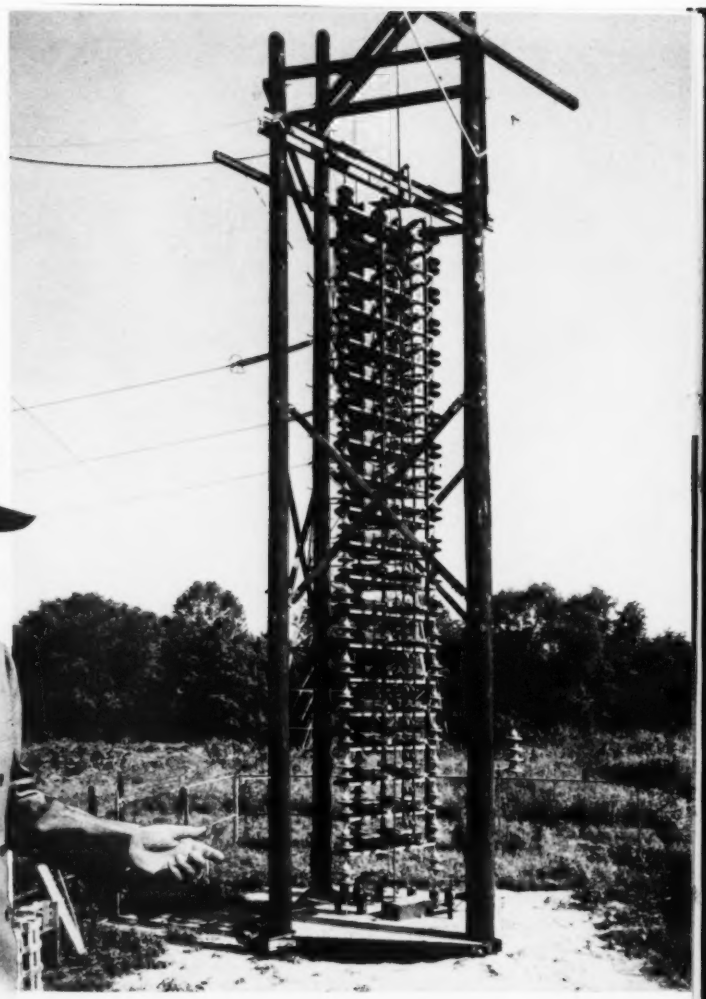
When considering communication problems, check the specific advantages of Westinghouse Equipment. Call your Westinghouse Representative or write Westinghouse Electric Corporation, Communications Section, 2519 Wilkens Avenue, Baltimore 3, Maryland. J-02265



Electrical connections to all panels, including the voice-band panel being pointed out by Bob Cheek, are of the plug-in type for greater flexibility.

Westinghouse

"Field tests with artificial lightning provide engineering information for future transmission."



The 2000-kv surge generator uses the Marx circuit, and consists of 20 capacitor stages in series, with each stage made up of two 50-kv capacitors.

As transmission voltages continue to increase, it becomes necessary to again evaluate design standards which could offset the factor of increasing equipment costs.

At American Gas and Electric's 500-kv experimental lines at Brilliant, Ohio, Westinghouse is sharing with A.G. & E. the challenge of answering that need. The Westinghouse Surge Generator installed at the open end of the two 1.5-mile lines can deliver, into one conductor, positive or negative surges of 1800-kv crest value. The surge can be applied to one conductor or any combination of conductors. The equipment at this site, because it is full scale and includes all the essential components, lends itself to testing at voltages comparable to those produced by lightning in actual systems.

There are many things to be learned from such full-scale field testing. But probably the most important is one of economics. The incremental cost of extra-high-voltage equipment calls for careful coordination of arrester characteristics and equipment insulation in order to maintain the lowest practical margin between protective levels and insulation levels.

Through application of the knowledge gained from this project and many others currently being executed, Westinghouse can assure its Utility customers of practical and economical transmission of larger and larger blocks of power. For further information regarding higher voltage transmission or products presented on preceding pages, call your Westinghouse Representative or write direct to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. CP-1005

YOU CAN BE SURE...IF IT'S Westinghouse

TWO NEW CRESCENT SCREWDRIVERS FEATURE TENITE HANDLES

K1300 and K1500 series

K1700 series

● Here's typical Crescent quality in a new line of plastic handled screwdrivers! Blades are hot forged and hardened full length. Then blade and handle are assembled under pressure so blade will never loosen. Finally, each screwdriver is individually tested to insure blade tips that will not break or twist.

You'll recognize these new Crescent Screwdrivers by their distinctive blue-colored Tenite handles, with soft-edged knurling that assures a sure grip without blistering the hand. Two patterns for slotted screws . . . one for Phillips head screws . . . in the sizes listed below.

STANDARD PATTERN (K1300 series)
5 sizes, 3" to 10" blade lengths.

CABINET PATTERN (K1500 series)
4 sizes, 3½" to 8½" blade lengths.

PHILLIPS POINT (K1700 series)
4 sizes, 3" to 6" blade lengths.
Point Numbers: 1, 2, 3 and 4

CRESCENT TOOLS
Give Wings to Work
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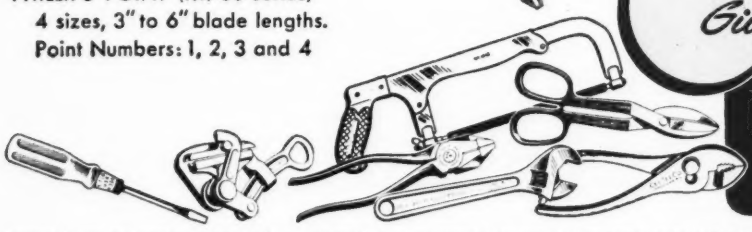
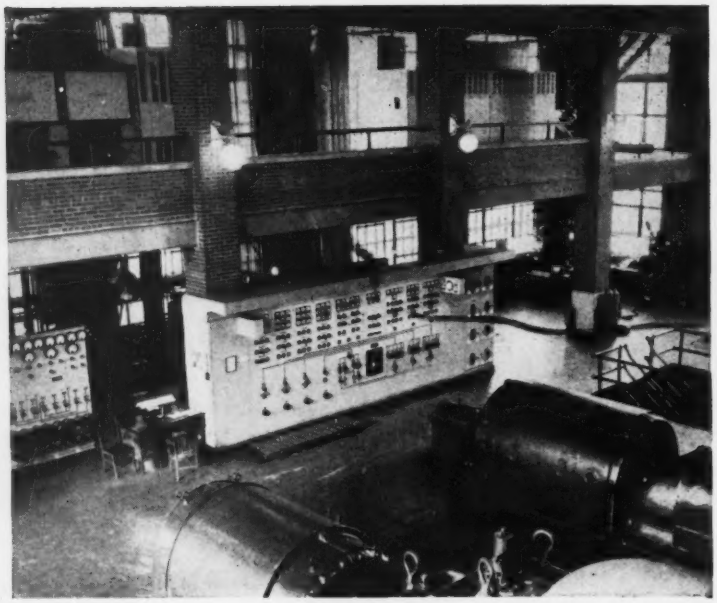
Sign of the Artisan
Symbol of Excellence

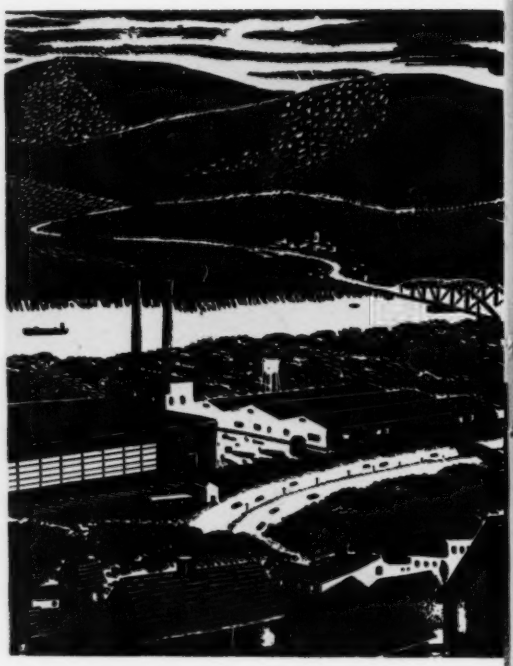


Crescent is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK



General view of turbine hall in a recently constructed municipal power plant.



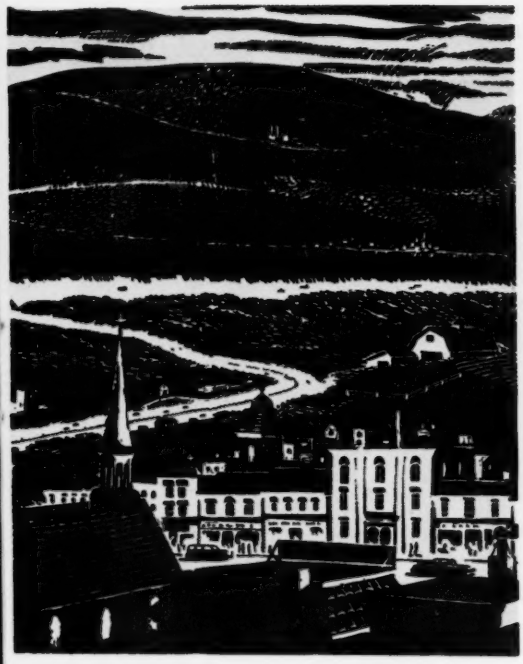
Only the best cable is

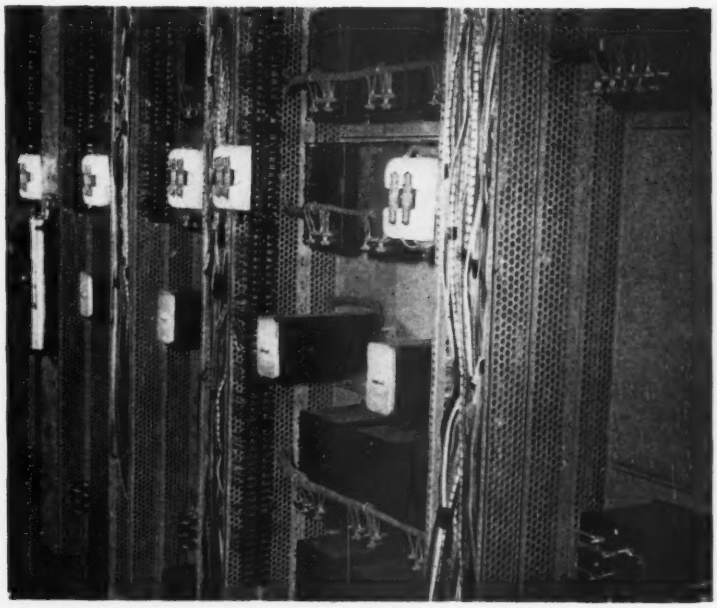
MODERN engineering practice often concentrates the entire operation of a power station in one central "brain". So complex is its electrical system that control cables of the finest quality are imperative.

On these pages is shown the panel which completely controls the generation and distribution of power in a typical modern central station. The idea in this installation was to obtain the maximum reliability for the generating station and the whole power system. Everything has been done with this in mind, including the selection of OKOLITE-OKOPRENE throughout.

Shown inside the rear housing of the main control and relay panels in the detail view are the many 600-volt color-coded cables that provide all interconnections for control, metering, indicator, interlock and alarm circuits. The wiring originates in the switch-gear on the balcony floor,

OKONITE SINCE 1878 *insulated cables . . .*





Rear of main control and relay panels showing Okolite-Okoprene control cables.

good enough for this job

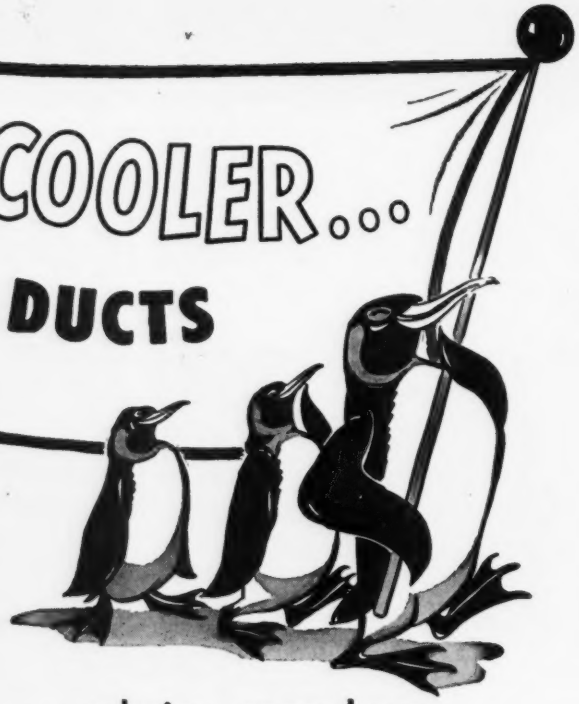
at the secondary terminals of the potential and current transformers and terminates at the control panel.

Wherever rugged operating conditions are found, wherever service requires that outages be kept to a minimum, electrical engineers for over 75 years have been specifying Okonite cables. They take advantage of the Okonite program of constant research to provide more dependable cables. They know Okonite's exclusive strip process . . . how the insulation and sheath are applied simultaneously and vulcanized *only once* in a metal mold, assuring perfectly centered conductors, a more stable and longer-lived insulation and sheath. For further information on OKOLITE-OKOPRENE cables, write for BULLETIN EW-1056. The Okonite Co. Passaic, New Jersey.

products of on-the-job experience

1951

Cables run COOLER...
in TRANSITE DUCTS



... reducing copper losses
... increasing current capacity
... prolonging insulation life

YOU REDUCE copper losses . . . increase current carrying capacity . . . and prolong insulation life, when you run your cables in Transite* Ducts.

Current carrying capacities can be increased in a typical duct bank as much as 5%, or I^2R losses can be reduced 11%, for cables located in Transite as compared with other ducts used for power circuits.

And, Transite Ducts assure permanent duct banks because Transite is incombustible; is immune to rust and rot; is unaffected by electrolysis; will not slag under action of an arc, and will retain its high original strength.

An unusually smooth bore assures no injury to cable sheath, either in natural movement under load, or when pulling-in cables. Long, lightweight lengths can be quickly and economically installed. In addition, a full line of fittings simplifies even the most complicated of installations.

For full information on Transite Ducts, write for Data Book DS-410. Johns-Manville, Box 60, New York 16, N. Y.

JM

*Reg. U. S. Pat. Off.

How Transite Ducts increase current carrying capacities

Type cable 3 cdr. 500 MCM Compack Sector, 15 KV (6th Edition AEIC Spec.)
No. of cables—3 (all loaded in one bank)
Daily Load Factor—75%
Earth Temp. ambient—20 C

	Transite	Other
Total Therm. Res. to Dielectric Loss (C watts/ft.)	5.66	6.17
Total Therm. Res. to Copper Loss (C watts/ft.)	4.44	4.95
Temp. Rise from Dielectric loss (C)	1.9	2.1
Allowable Rise for Copper loss (C)	59.1	58.9
Allowable Watts per ft. cable	4.44	3.96
Allowable Current—(Amps. per cdr.)	386.	365.
Allowable Current—(Relative %)	105.6	1.00.

Johns-Manville *Transite Ducts*

TRANSITE KORDUCT—for installation in concrete

TRANSITE CONDUIT—for exposed work and installation underground without a concrete encasement

LET'S LOOK AT THE FACTS

FIGURE 1. Cover bushings on an L-M Round-Wound 15 kva 7200 volt transformer. Note the generous width of skirting for high creepage distance, the four-bolt cover clamp that assures even pressure on gasket and porcelain.

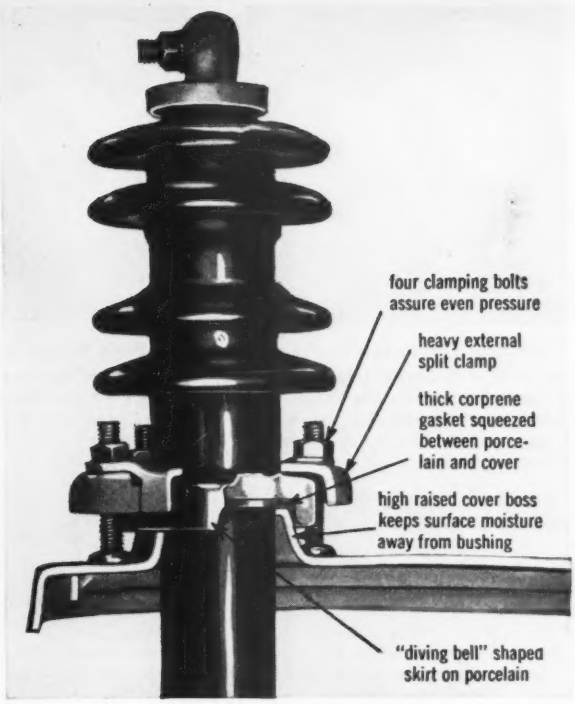

four clamping bolts assure even pressure
heavy external split clamp
thick corprene gasket squeezed between porcelain and cover
high raised cover boss keeps surface moisture away from bushing
"diving bell" shaped skirt on porcelain

FIGURE 2. Close-up of triple-seal against moisture. 1. Deep-skirted porcelain gives "diving bell" effect. 2. Thick corprene gasket, squeezed between porcelain and steel boss. 3. Deep-drawn cover boss keeps moisture away.

Cover Bushings on L-M Round-Wound Transformers Triple-Protected Against Moisture, Corona

"Diving Bell" design porcelain, thick corprene gasket, and high raised boss on cover provide triple barrier

By **ALVIN B. COYLE,**
Manager Transformer Sales
Line Material Company

In the design of cover bushings, L-M engineers have gone to great lengths to eliminate moisture entrance and corona, which would cause undesirable radio interference.

The porcelain itself is designed with exceptionally generous creepage distance and high wet-flashover characteristics. The best grades of electrical porcelain are used, with the surface fully glazed. At the bottom is an extra skirt or lip, which is curved downward to give a "diving bell" effect in keeping moisture away from the gasket.

The porcelain is mounted on an exceptionally high raised boss in the cover, which in itself leads moisture away from the bushing. Between the boss and the porcelain is a thick corprene gasket tightly squeezed by the four-bolt cover clamp. Corprene has the initial hermetic sealing property of synthetic rubber plus the elasticity and non-flowing characteristics of cork to maintain a permanent vapor-proof seal.

The result is a bushing that provides exceptional protection against moisture and breathing; it is corona-free and causes no radio interference.

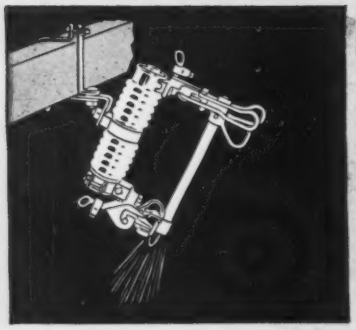
Get Full Information

These cover bushings are standard equipment on all L-M Round-Wound transformers of 5000 volts and over. For more information on these and other features of these outstanding distribution transformers, ask the L-M Field Engineer; or write Mr. Coyle at the Transformer Division, Line Material Company, Zanesville, Ohio (a McGraw Electric Company Division).

"Round Wound" is a Line Material Company trademark.

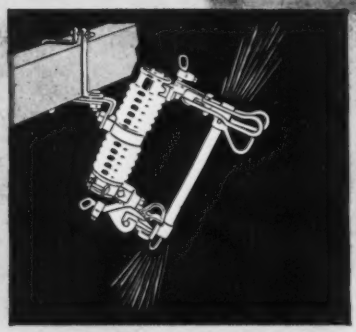
LINE MATERIAL 87R
Transformers
Complete Coordinated Equipment for Distribution Today

LM® ORTO



On Low Amperage Faults

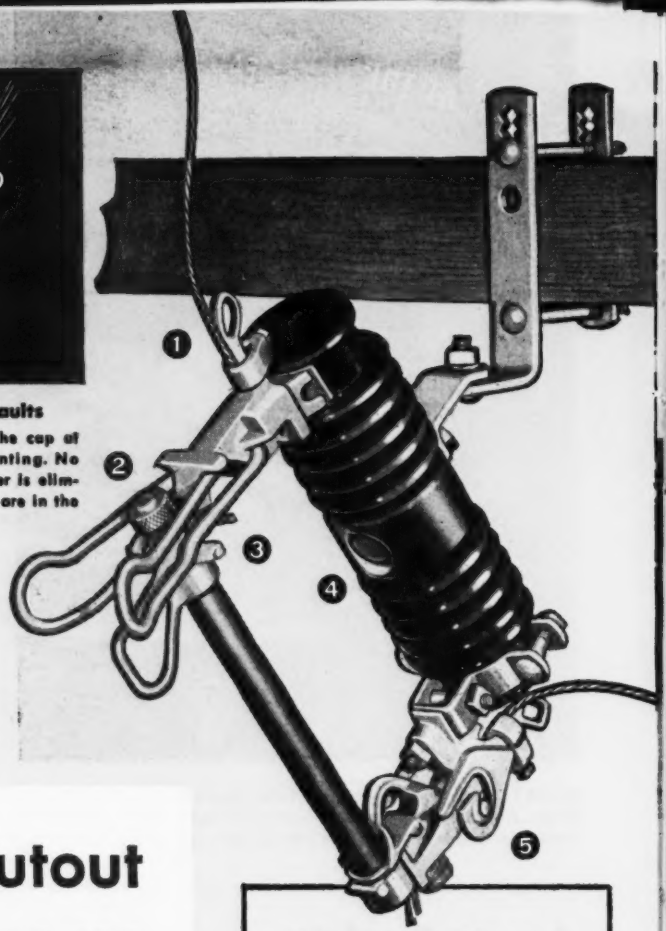
single venting, at bottom only, provides ample pressure to expel the arc and the fuse link, before the tube drops down. In this case, only the fuse link needs to be replaced, not the cap.



On High Amperage Faults

pressure automatically opens the cap at the top to provide double venting. No bursting of tubes. Gas flashover is eliminated because no cutout parts are in the path of gas discharge.

This expendable cap acts as an automatic escape valve. On low faults it remains undisturbed. On heavy faults the top opens, as shown at right, relieving the pressure.



L-M's "HCO" Fuse Cutout Provides 8000 Amperes Interrupting Capacity

For the first time, high interrupting capacity is available at low cost, in L-M's new open type distribution cutout. The increased interrupting capacity of the "HCO" is available at only about $3 more than the price of standard duty open type cutouts. This makes the "HCO" the lowest priced cutout of its type.

The "HCO" is ingeniously designed to handle both low amperage and high amperage faults equally well, with standard distribution fuse links.

This is accomplished by the automatic pressure-controlled expendable cap at the top of the tube. On low amperage faults, the cap remains intact, confining the pressure and providing bottom venting only. On high amperage faults, the diaphragm in the cap opens, relieving the pressure by providing double venting.

The "HCO" is completely bird-proof. The tube can be removed and replaced with the standard head hook-stick. It takes standard distribution fuse links.

Get details from the L-M Field Engineer; or write for Bulletin. Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

Rated at 5, 7.5, and 15 KV, 100 amperes.

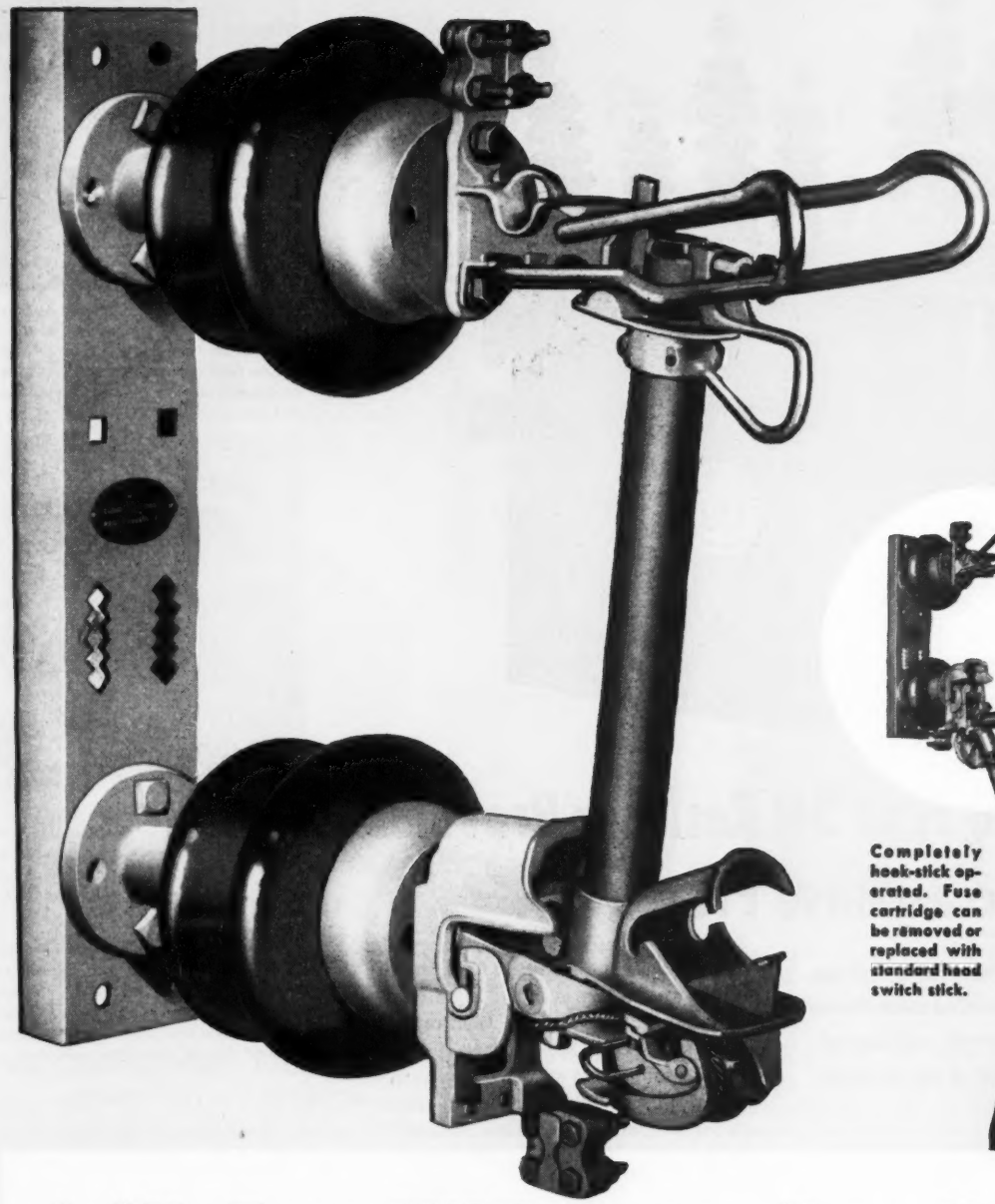
NOTICE THESE FEATURES

1. Rated at 5, 7.5, and 15 kv, 100 amperes, with 8000 amperes interrupting capacity using any size standard universal fuse links.
2. Expendable cap acts as automatic pressure-controlled vent to provide double venting on high amperage faults.
3. All current-carrying parts are silver plated.
4. Completely bird-proof design.
5. Heavy, closely fitted L-M—patented double hinge takes all the recoil forces. Top contacts not stressed by recoil. In reclosing, the hinge guides the tube directly between the contacts—it can't miss the top contacts.

The expendable caps, replaced only when the link blows on a high amperage fault, are economical, easily replaced. They are supplied in a cloth bag, carried with the fuse links.

LINE MATERIAL

fuse cutouts and fuse links



Completely hook-stick operated. Fuse cartridge can be removed or replaced with standard head switch stick.

L-M's Type HXO Power Fuse Cutout Interrupts up to 20,000 Amperes

Double-Venting: replaceable fuse link button closes top of tube; on low-amperage faults, the tube vents at bottom only; on high faults, pressure releases button at top, giving double-venting. This insures successful interruptions on both low and high fault currents.

Rated at 200 amperes, with interrupting capacities as follows:

20,000 amps at 7.5 kv
15,000 amps at 15 kv
9,000 amps at 23 kv
5,000 amps at 34.5 kv
4,000 amps at 46 kv

These interrupting capacities apply for full range of fuse link sizes from 1 ampere through 200 amperes.

Replaceable Power Fuse Link

Field-replaceable E-rated power fuse links, similar in design and construction to those used in distribution cutouts. No cartridges to replace, no filler tubes to buy. Designed for positive corona-free operation at high currents and voltages. Ratings and performance meet NEMA Power Fuse Standards.

L-M Power Fuse Links cost only $2.60 each (smaller sizes $1.60) compared to other cutouts requiring complete cartridges at $10 or more. Sizes from 1 to 200 amperes.

Get Full Information on the HXO

Ask the L-M Field Engineer for details and bulletin, or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

LINE MATERIAL

fuse cutouts

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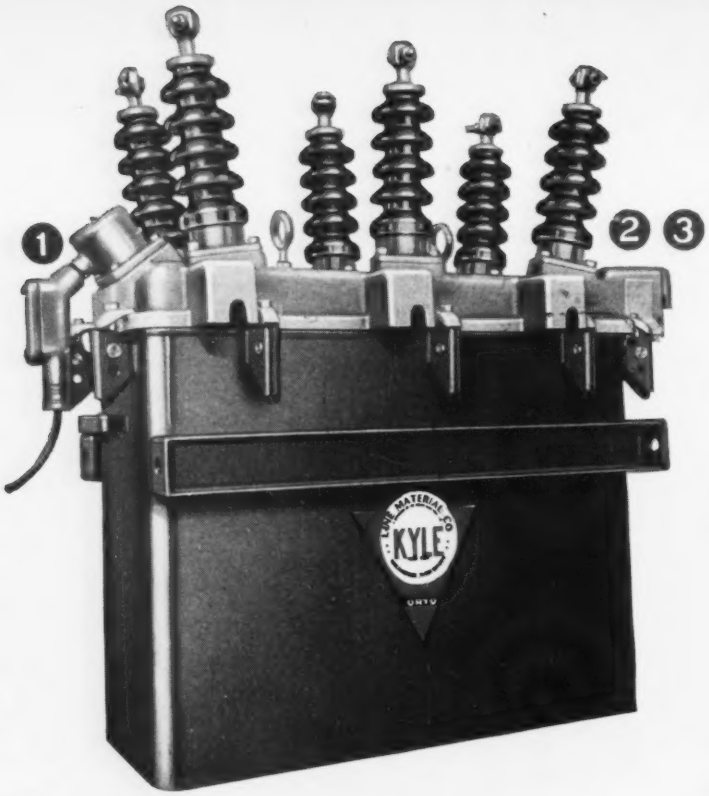


L-M's Kyle Type 3H Recloser Provides Automatic 3-Phase Protection

With three units in one tank, linkage tolerances can be controlled more closely, insuring more accurate and dependable 3-phase operation of the recloser.

The Kyle Type 3H 3-phase recloser provides individual reclosing and resetting on each phase for temporary faults. In case of permanent fault on any one phase, the recloser locks out *all three phases simultaneously*.

The Kyle 3H Recloser can be coordinated with sectionalizers or branch line fuses to isolate permanent faults to small sections of the system. Because all three units are in one tank, there is no external linkage; and greater operating accuracy and dependability are assured.

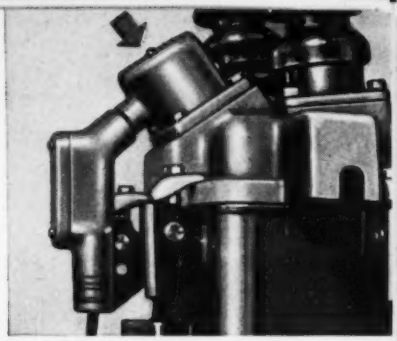
Positive toggle action; fast opening and closing do not depend on gravity. The Kyle hydraulic mechanism has proved itself over years of service to be dependable and trouble free.

The Kyle 3H can be applied on systems up to 15 kv, with nominal load ratings from 5 to 50 amperes and minimum trip currents from 10 to 100 amperes. Coils are easily changed right in the field. Interrupting ratings from 150 to 1200 amperes. Trip-free operating handle and all other Kyle safety features. Plated Universal bushing terminals for copper or aluminum. Available with the accessories shown at the right.

Get the Whole Story of Automatic Protection

Ask the L-M Field Engineer for a copy of Bulletin CR-1, or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

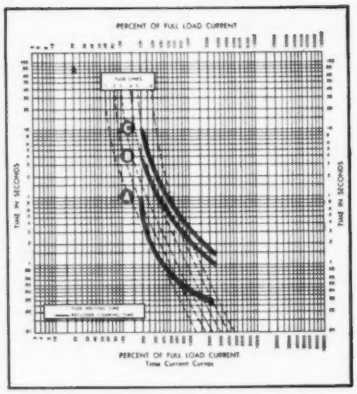
Like all Kyle reclosers, the Type 3H is filled with ORTO®, L-M's oxidation-resistant transformer oil.



1 SHUNT TRIP COIL: an optional accessory that permits tripping the recloser from a distant point so it will not reclose. Or for ground fault-tripping with relay or other control equipment, the coil locks out the recloser in one fast operation. Must be built in at the factory.

2 KYLE NON-RECLOSING FEATURE: when control lever is down, this accessory prevents automatic reclosing, providing fast lockout on the first operation, for greater safety for men and equipment during hot line work. Available on all Kyle reclosers.

3 AUXILIARY SWITCH: an SPDT switch that may be attached to a Kyle 3H recloser. It may be used either to operate a remote indicator light to show when the recloser is open and closed; or as a limit switch to cut off current from the shunt trip coil after it has operated.



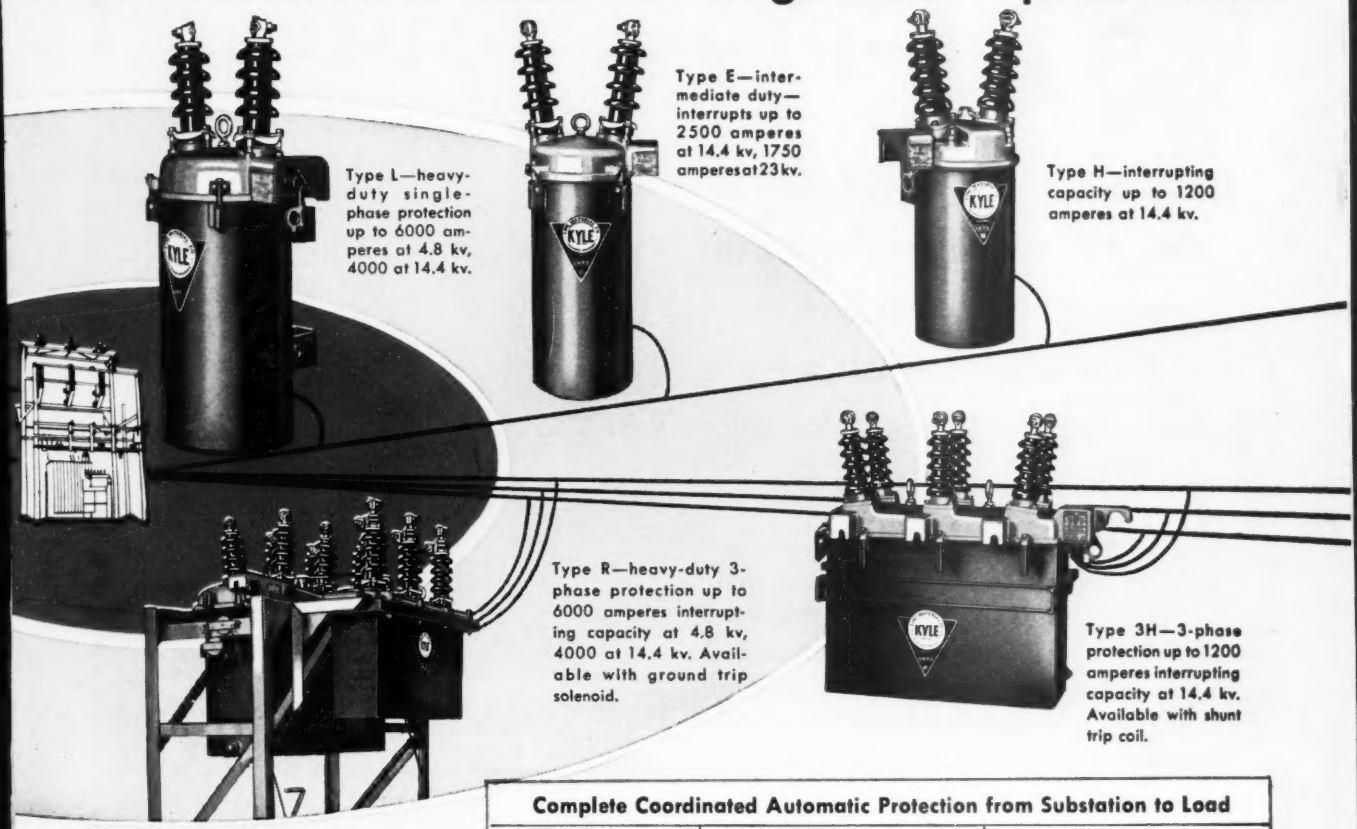
Kyle Reclosers offer the widest choice of time-current curves and sequences. You can select from Curve A, fast; B, retarded; C, extra-retarded. Choice of seven sequence combinations; sequences quickly changed right in the field.

LINE MATERIAL
Kyle® Reclosers

L-M now offers

Complete Automatic Recloser Protection

from Substation to Load—for single and 3-phase lines



Type L—heavy-duty single-phase protection up to 6000 amperes at 4.8 kv, 4000 at 14.4 kv.

Type E—intermediate duty—interrupts up to 2500 amperes at 14.4 kv, 1750 amperes at 23 kv.

Type H—interrupting capacity up to 1200 amperes at 14.4 kv.

Type R—heavy-duty 3-phase protection up to 6000 amperes interrupting capacity at 4.8 kv, 4000 at 14.4 kv. Available with ground trip solenoid.

Type 3H—3-phase protection up to 1200 amperes interrupting capacity at 14.4 kv. Available with shunt trip coil.

New Kyle heavy-duty Type R 3-phase recloser makes L-M first to offer a complete, coordinated line

As shown in the illustration, L-M now provides complete automatic protection from substation to user, in both single-phase and 3-phase recloser units.

The new Kyle Type R provides up to 100,000 kva interrupting capacity—up to 6000 amperes—ample for a good-sized substation or for heavily loaded feeders with high fault currents. The Kyle Type 3H completes the 3-phase line with up to 1200 amperes interrupting capacity.

In single-phase, the Kyle Type L provides up to 6000 amperes, for substation or heavily loaded feeders; the Type E covers the range from 1200 to 2500 amperes, and the Type H provides single-phase protection up to 1200 amperes.

Ask the L-M Field Engineer for information and bulletins on the complete Kyle line; or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

Complete Coordinated Automatic Protection from Substation to Load

Distribution Class Nominal Voltage Rating 14.4 kv BIL 95 kv			Intermediate Duty Nominal Voltage Ratings 23 kv BIL 150 kv				Heavy Duty Nominal Voltage Ratings 14.4 kv BIL 110 kv			
Single-Phase Type H Three-Phase Type 3H			Single-Phase only Type E				Single-Phase Type L Three-Phase Type R			
Rating Amps.	Min. Trip	Inter. Rating* 14.4 kv	Rating Amps.	Min. Trip	Inter. Ratings* 14.4 kv	23 kv	Rating Amps.	Min. Trip	Inter. Ratings* 4.8 kv	14.4 kv
5	10	150	5	10	200	125	....	...	....	....
10	20	250	10	20	400	250	....	...	....	....
15	30	375	15	30	600	375	....	...	....	....
25	50	600	25	50	1000	625	25	50	1500	1500
35	70	840	35	70	1400	875	35	70	2100	2100
50	100	1200	50	100	2000	1250	50	100	3000	3000
			70	140	2500	1750	70	140	4200	4000
			100	200	2500	1750	100	200	6000	4000
							140	280	6000	4000
							160#	320	6000	4000
							185#	370	6000	4000
							200**	400	6000	4000
							225#	450	6000	4000
							280#	560	6000	4000

*Recloser interrupting ratings are based on the maximum test circuit X–R ratio of not less than 8 and the asymmetrical rating in total RMS amperes is 1.4 times the symmetrical ratings given in the table.
#Available in three-phase Type R only. **Available in single-phase Type L only.

For Ground Fault Tripping: Type R heavy-duty 3-phase recloser is available with built-in ground trip solenoid and auxiliary current transformer. Type 3H is available with a shunt trip coil which may be used for ground fault tripping with suitable auxiliary equipment.

100

LINE MATERIAL Kyle® Reclosers

COMPLETE COORDINATED AUTOMATIC PROTECTION FROM SUBSTATION TO LOAD

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is a job-proved success!

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Motorola engineers, with over 24 years experience and research in mobile radio communication, have installed *more than 70%* of all operating pipeline microwave systems. Flashing through space with the speed of light, voice messages, telemeter, teleprinter and supervisory control signals span thousand-mile pipelines with instant 2-way contact—cut communication costs, save vital man-hours, speed industrial operations.

Motorola custom-tailored systems provide full communications facilities for industry, transportation, utilities and public services. Microwave and VHF radio tie-ins blanket plant areas, railroads, pipelines and entire cities. Your business, too, can profit from Motorola 2-way radio—write today for friendly Motorola engineering service.

The Motorola paraboloid antenna—symbol of modern communication systems, beams multi-channel microwave signals to distant repeater stations.

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Brazos River Electric Transmission Cooperative, Waco, Tex.
Illinois Power Co., Decatur, Ill.
Central Illinois Public Service Co., Springfield, Ill.
Pan American Pipeline Co., Houston, Tex.
Shell Pipeline Co., Houston, Tex.
Panhandle Eastern Pipeline Co., Kansas City, Kans.
Mid-Valley Pipeline Co., Longview, Tex.
Southern Counties Gas Co., Los Angeles, Calif.
*Santa Fe Telephone Co., Melrose, Fla.
*La Fourche Telephone Co., Golden Meadow, La.
*Greenwood Telephone Co., Greenwood, So. Car.
*Middle South Utilities, Pine Bluff, Ark.
*Bonneville Power Administration, Chehalis, Wash.
*Sinclair Pipeline Co., Independence, Kans.
*Freeport Sulfur Co., New Orleans, La.
*Texas Electric Co., Ft. Worth, Tex
**West Coast Telephone Co., Everett, Wash.
U. S. Atomic Energy Commission
**Dayton Power & Light Co., Dayton, O.
**Southern California Edison Co., Los Angeles, Calif.

—with 20 additional systems under construction

*Under construction **Under contract

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Your requirements for crepe paper insulation can now be supplied by Irvington — the *leader* in electrical insulation.

Crepe paper and oil are degasified under very high vacuum to assure freedom from moisture and provide good electrical properties.

The paper is packaged in cans to meet your specific requirements for number and size of rolls. Roll sizes include ½" x 4 yards, 1" x 4 yards, 1" x 18 yards, 1" x 36 yards. Cotton yarn and copper mesh can also be included.

Use Irvington Crepe Paper on your low- and medium-pressure gas-filled cable — and also on oil-filled and pipe-type cable.

Look to
IRVINGTON
for Insulation Leadership

INSULATING VARNISHES
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VARNISHED PAPER
VARNISHED FIBERGLAS
INSULATING TUBING
CLASS "H" INSULATION

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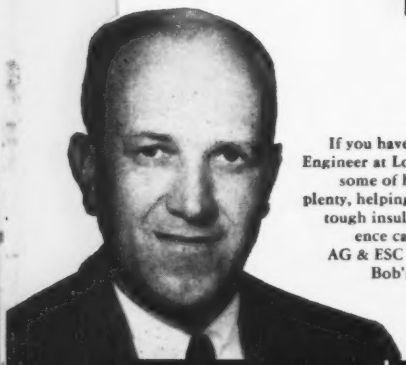
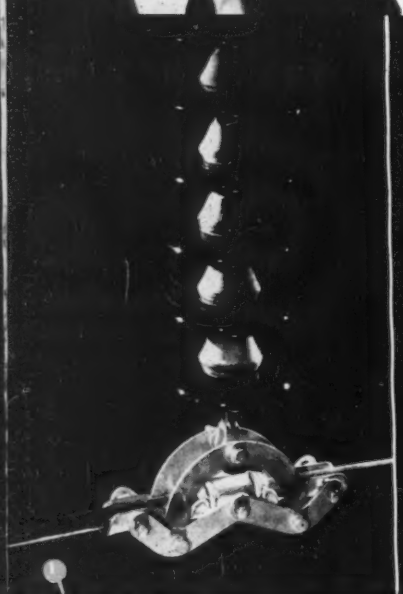
"Check your buying experience against this case of American Gas & Electric Service Corporation," suggests Bob McCoy. "You'll know!"



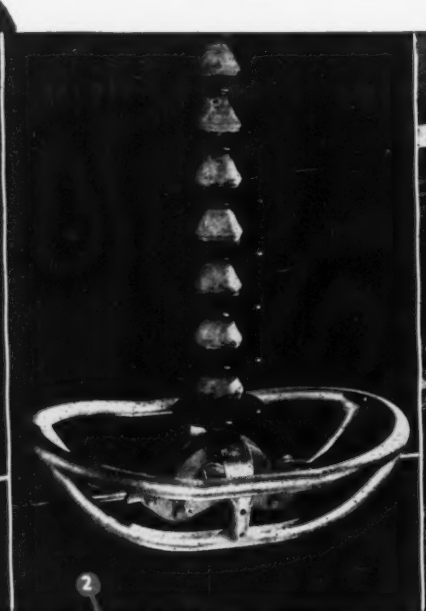
ROBERT L. "BOB" McCOY

If you haven't met Bob McCoy—chief Design Engineer at Locke . . . you probably know about some of his achievements. Bob gets around, plenty, helping Locke customers lick all kinds of tough insulator problems. His 28-year experience came in mighty handy in this case of AG & ESC which Bob describes for you here. Bob's *our* man . . . but remember, when you've got a "toughie," he's *yours* for the asking!



1

New Suspension Clamp Developed — To support the large, hollow copper conductors used on the TIDD 500 kv experimental line, Locke designed and furnished a radically new articulated suspension clamp, much shorter and lighter than conventional clamps. Overall length of the new Locke clamp is 18 inches long, compared with the 32 inch overall length of a conventional clamp.



2

New Corona Shield Developed — To lick the corona problem on the TIDD 500 kv transmission line experiment Locke developed a new concept in corona shields. These shields graded the insulator strings and suppressed corona on the lower, highly stressed units. They also enveloped the suspension clamp, thus removing it from the high voltage field and suppressing corona on any part of the clamp itself.

3

Valuable New Data was revealed by extensive flashover tests conducted in the Fred M. Locke High Voltage Laboratory on varied suspension strings. These flashover tests were made with the insulators supported in a specially developed test rig to simulate true electrical conditions. As a result, important data was developed which helped establish the proper number of insulators to use per string.

"When a new high voltage system was planned by the American Gas & Electric Service Corporation, Locke was given an opportunity to participate in the early development stage . . . and follow through to the conclusion," explains Bob.

"Our first job was to cooperate in the company's TIDD 500 kv transmission research project. At this voltage, one of the big problems was corona suppression. The pictures show the special products Locke developed to help the company lick this problem.

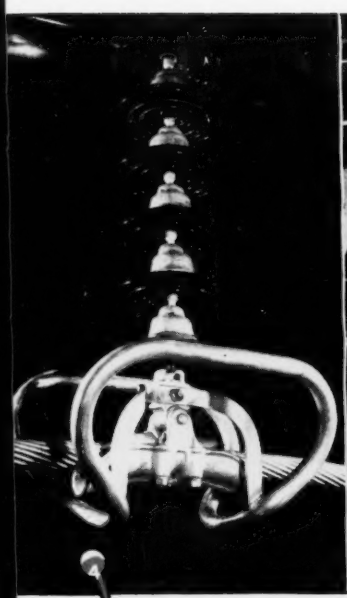
"After the experimental TIDD tests were completed, it was decided that 330 kv best suited the system's requirements. Naturally, this called for a re-study of the whole problem with emphasis on reducing size and cost, as well as how to make hot line maintenance work easier and safer. Here again the pictures show you what Locke did to help AG&E lick the problem.

"In my opinion," observes Bob, "this is an outstanding case of how Locke can . . . and does . . . provide unusual and often most unexpected services for its customers. And remember—all of these 'service extras' are included in the regular price you pay for Locke insulators.

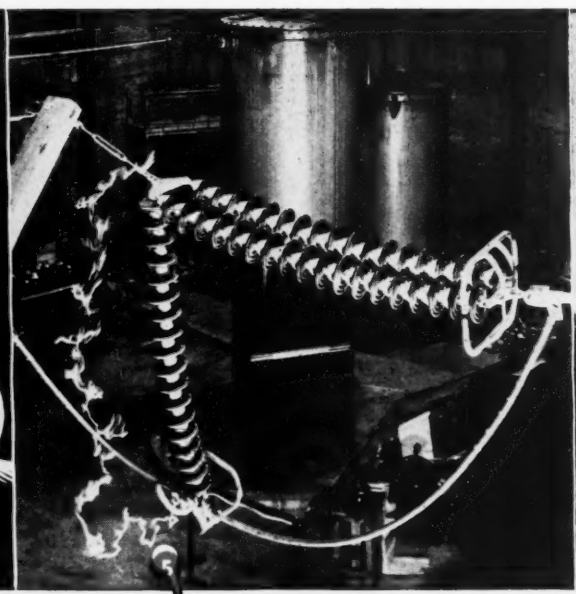
"So whenever you run into a problem of insulator design or application," urges Bob, "bring it to Locke. Your problem will be solved with the aid of one of the world's finest high voltage and mechanical research and development laboratories . . . staffed by engineers who are experts in the design and operation of insulators, as well as associated fittings."

LOCKE

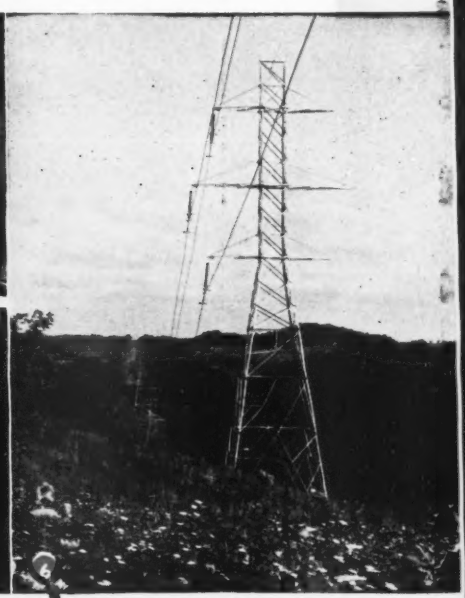
LOCKE DEPARTMENT
GENERAL ELECTRIC COMPANY
BALTIMORE, MARYLAND



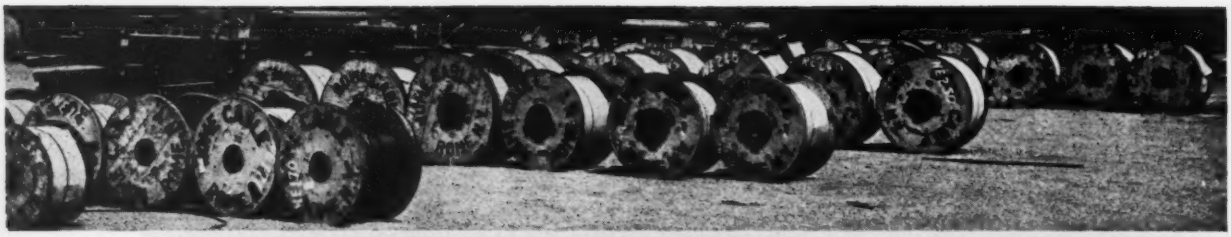
Hot Line Work Made Easier and Safer—At the conclusion of the TIDD tests, it was decided that 330 kv best suited the system's requirements. The entire problem was re-studied with an eye toward reducing size and cost and to make hot line maintenance easier and safer. The light weight, aluminum corona shields which can be removed and replaced on the suspension strings by removing only one self-locking nut was Locke's answer to the hot line maintenance problem.

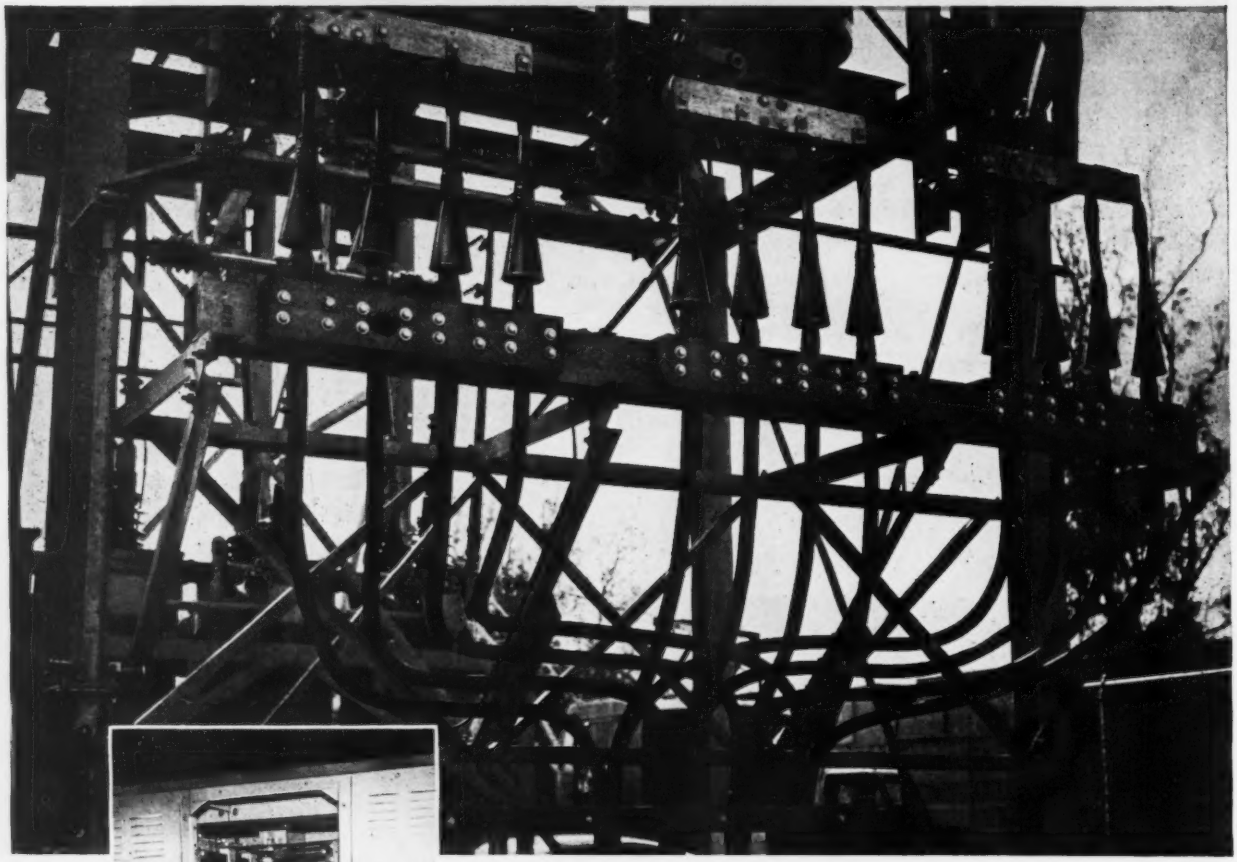


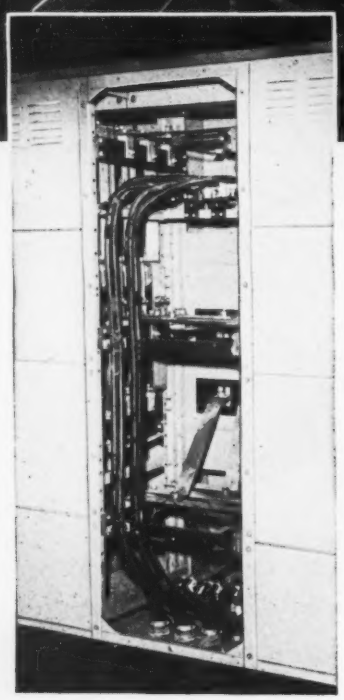
Shield Removal Made Easier—In the case of the dead-end strings, Locke developed shields which can be removed and replaced by removing only two self-locking nuts. Instead of the shield being made in two halves, a one-piece shield was developed having an opening on the under side to clear the jumper loop. This one-piece shield was supported by two supports from the upper side with which bolts for attaching to the strain yoke were made integral.



Lines Now Operating—Today the first of these extra high voltage lines is in operation at 138 kv on the system of the Appalachian Electric Power Company. Half of this line is Locke equipped. Based on Locke laboratory tests made on the Tidd Line, the company has complete confidence that the lines will perform as expected when the new 330 kv service is made available. Locke welcomes unusual opportunities like this to assist its customers.



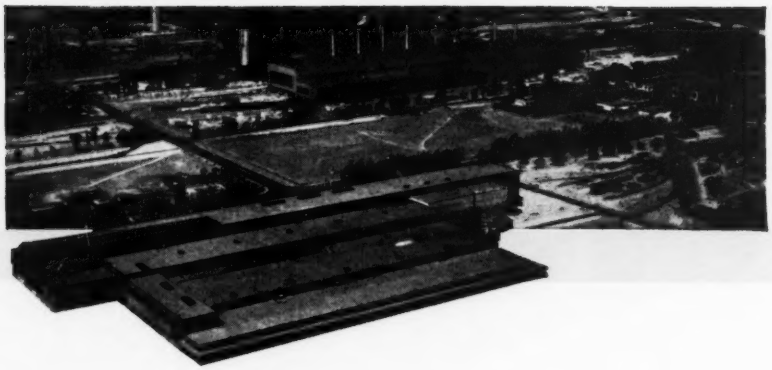




Outdoor connections at switch yard. Note manually prepared terminals.

The 600 volt cable for motor connections and single conductor control cable was RoMarine-RoPrene, style RR-D. All sizes from No. 12 to 1000 CM style RR-D were used for this service.

Multi-conductor control cable in this installation is RoLene (polyethylene) insulated and Rome Synthinol sheathed, described by Rome Cable specification CT-2.



Recently built Kaiser Steel Tin Plate Mill (left foreground), Fontana, California. Capacity is 200,000 tons of tin plate per year.

Electrical Contractor:
Kaiser Engineers, Inc.

How Kaiser Steel licked 3 tough cable problems all at once

In selecting power cables for 6.9 KV circuits at its new Fontana Tin Plate Mill, Kaiser Steel Corporation faced three knotty problems:

First, the hazard of acid and alkali corrosion was severe.

Second, the threat of electrolytic action was more than a possibility.

Third, termination and splicing costs were important factors.

Kaiser's choice for this service fell to single conductor, 500,000 CM Rome RoZone-RoPrene shielded power cable, insulated for 9 KV. Two sets were installed to connect the main substation with two 6,900 volt busses in the tin mill proper. Total connected load to the busses was 19,000 HP of M-G motors and 14,250 KVA of transformers.

Why RoZone-RoPrene

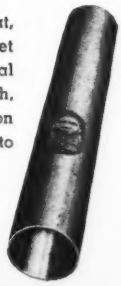
RoZone insulated, RoPrene sheathed cables offer maximum protection against acids, alkalies, oils, greases, moisture, heat, sunlight, and flame. They are non-metallic sheathed and require no lead sheaths. Their RoZone (premium quality oil base) insulation provides exceptional resistance to corona action and ozone cutting.

Simple manual terminations eliminate the need for potheads. Standard splicing kits only are needed; no costly wiped joints. And the smooth surface of the RoPrene (Neoprene compound) sheath makes for easy working and pulling through conduits and junction boxes.

HELPFUL INFORMATION—Whether your electrical requirements involve special cable designs to meet severe service conditions or simple home wiring, consider the advantages Rome products offer from the standpoint of price and quality. For information that you may find immediately useful, send for the *Rome Power and Control Cable Catalog* illustrated below.

500,000 CM, single conductor shielded, RoZone-RoPrene power cable, rated at 9 KV.

To give wires and cables added protection against heat, moisture, corrosion and abrasion, several thousand feet are encased in Rome • EMT. This is a superior electrical metallic tubing, electrically welded for extra strength, with an electrogalvanized exterior surface for protection against corrosion and a mirror-smooth interior surface to prevent cable injury.



You'll get a wealth of helpful information from the Rome Power and Control Cable Catalog. It contains 65 pages of illustrated information, specification and test data on all Rome power and control cables and on famous Rome insulations. Mail the coupon for your copy today.

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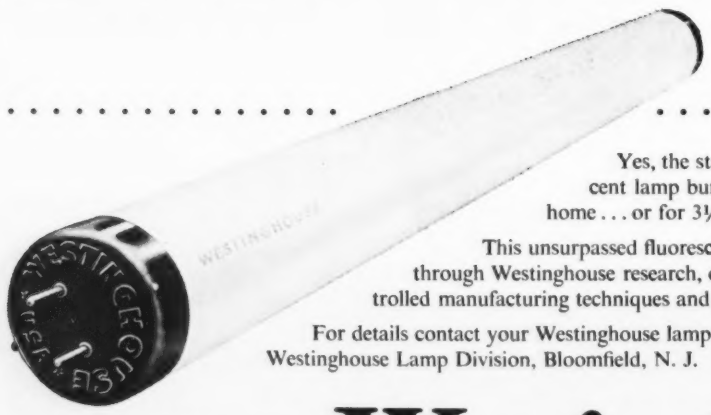
BEFORE YOUR WESTINGHOUSE FLUORESCENT LAMP BURNS OUT



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For details contact your Westinghouse lamp supplier or write to Westinghouse Lamp Division, Bloomfield, N. J.

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- Withstands Mercurous Nitrate Specification ABW-124-1* which insures against seasonal and stress corrosion cracking failures.
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* Identical to ASTM B-154-45 Mercurous Nitrate Specification except ABW-124-1 specifies stressed components which is a more severe test.

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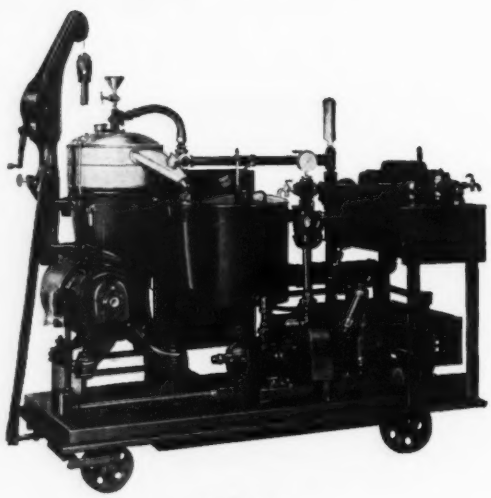

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Ohio Power Company, Canton, Ohio
- **Electric Range Activity**

Pennsylvania Power & Light Co., Allentown, Pa.
- **Electric Water Heater Activity**

Philadelphia Electric Co., Philadelphia, Pa.
- **Electric Dishwasher Activity**

Appalachian Electric Power Co., Roanoke, Va.
- **Commercial Electric Cooking Activity**

Utility Companies With Under 150,000 Meters

Minnesota Power & Light Co., Minneapolis, Minn.
- **Electric Range Activity**

Central Ohio Light & Power Co., Findlay, Ohio
- **Electric Water Heater Activity**

Kentucky & West Virginia Power Inc., Ashland, Ky.
- **Commerical Electric Cooking Activity**

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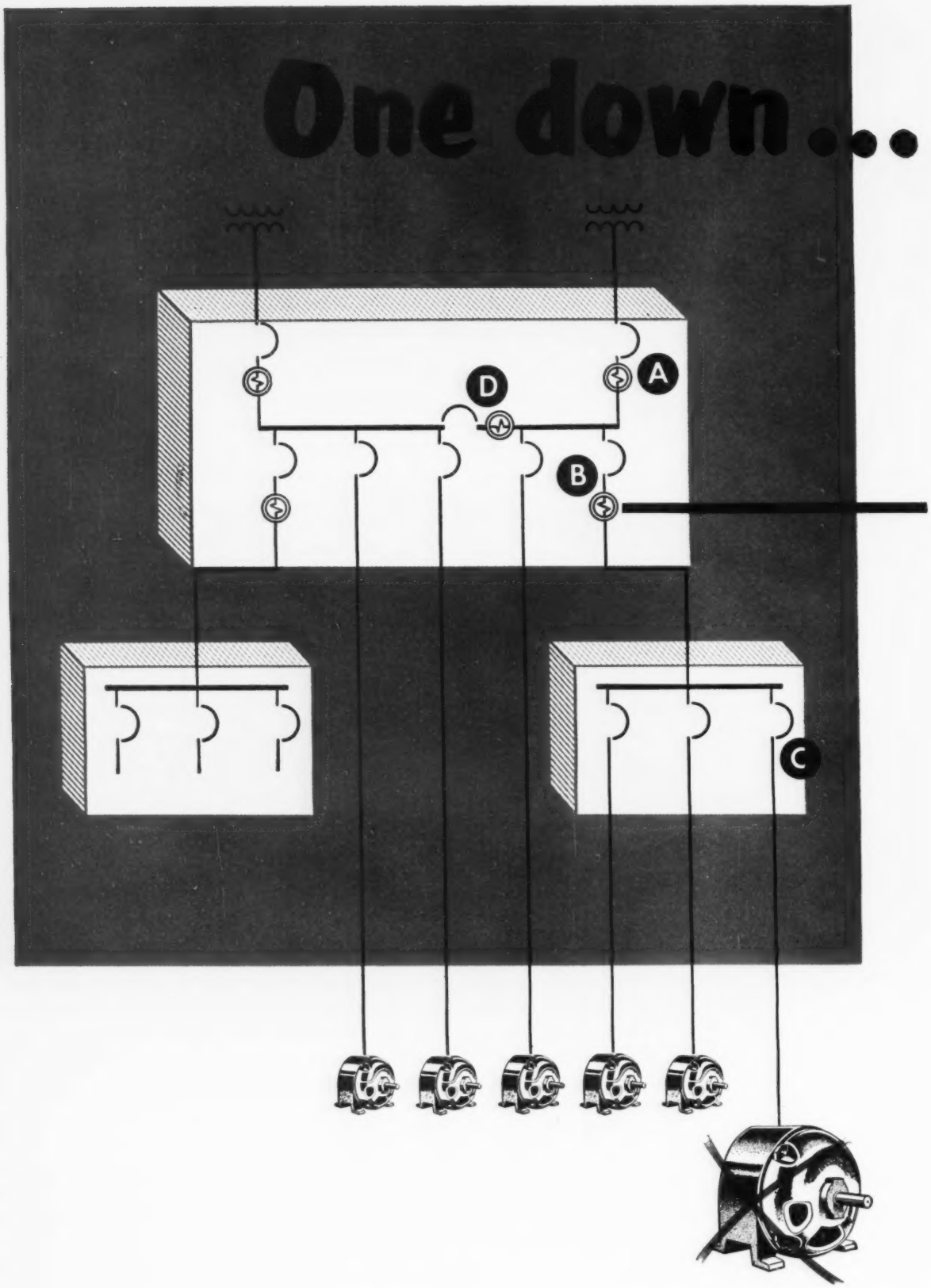
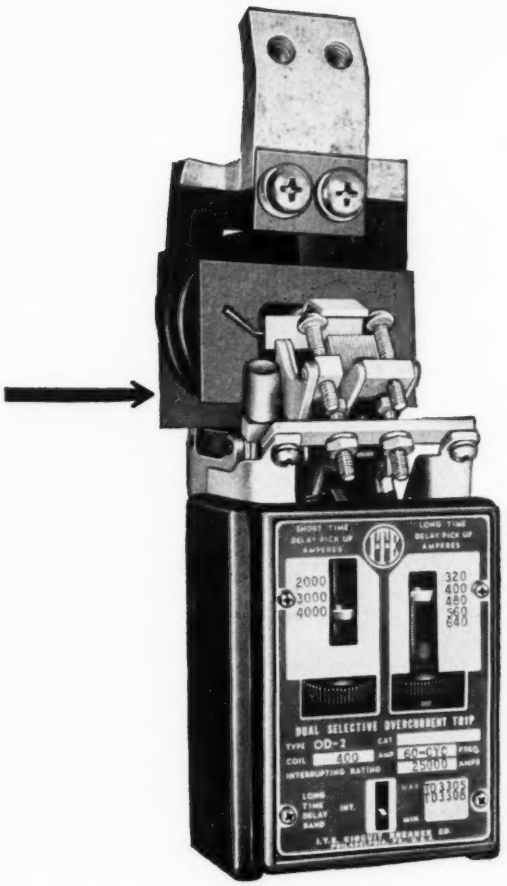

One down...
A
B
C
D

or shutdown?



Selective tripping on I-T-E Circuit Breakers isolates system faults, boosts system reliability

What selective tripping is

Selective tripping is the economical means for providing reliable electrical service with complete freedom from general interruption. With selective tripping, several circuit breakers may be used in series; yet on overcurrent or fault, *only* the faulted circuit is interrupted.

What it does

Consider the following cases for a typical low-voltage system:

Without selective tripping—the overloaded motor in the diagram at left could cause breakers C, B, D, and A to trip, shutting down a boiler, a plant, or an entire system. This *will* happen, if the system does not include circuit breakers equipped for selective tripping.

With selective tripping—only breaker C will trip. A motor saved, one circuit interrupted, while *the rest of the system continues to operate—unaffected.*

Consider I-T-E selective tripping for your system

In central stations, in manufacturing plants, in the processing industries—I-T-E selective tripping has saved in initial investment, boosted system reliability, and reduced breaker maintenance. If you're planning a new low-voltage switchboard application, investigate the advantages of direct-acting **I-T-E trip devices.**

I-T-E trip device is a compact circuit breaker component

Selective tripping in low-voltage systems is easily applied with I-T-E Circuit Breakers. The breakers are simply equipped with compact I-T-E *direct-acting dual-selective overcurrent trip devices.* No expensive current transformers, no relays, no added switchboard panels are required. The trip devices are fitted as an integral part of the breaker.

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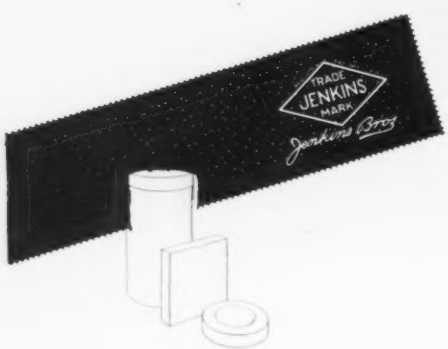

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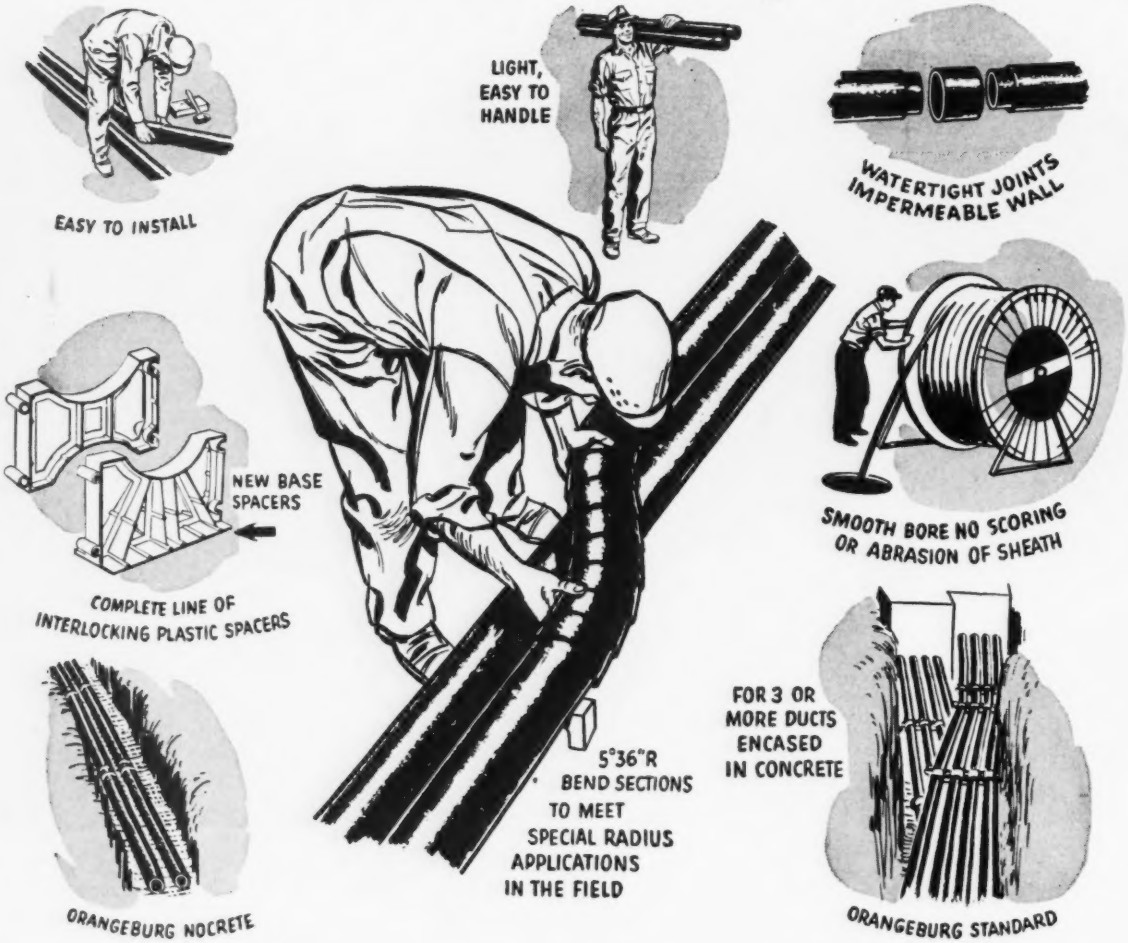
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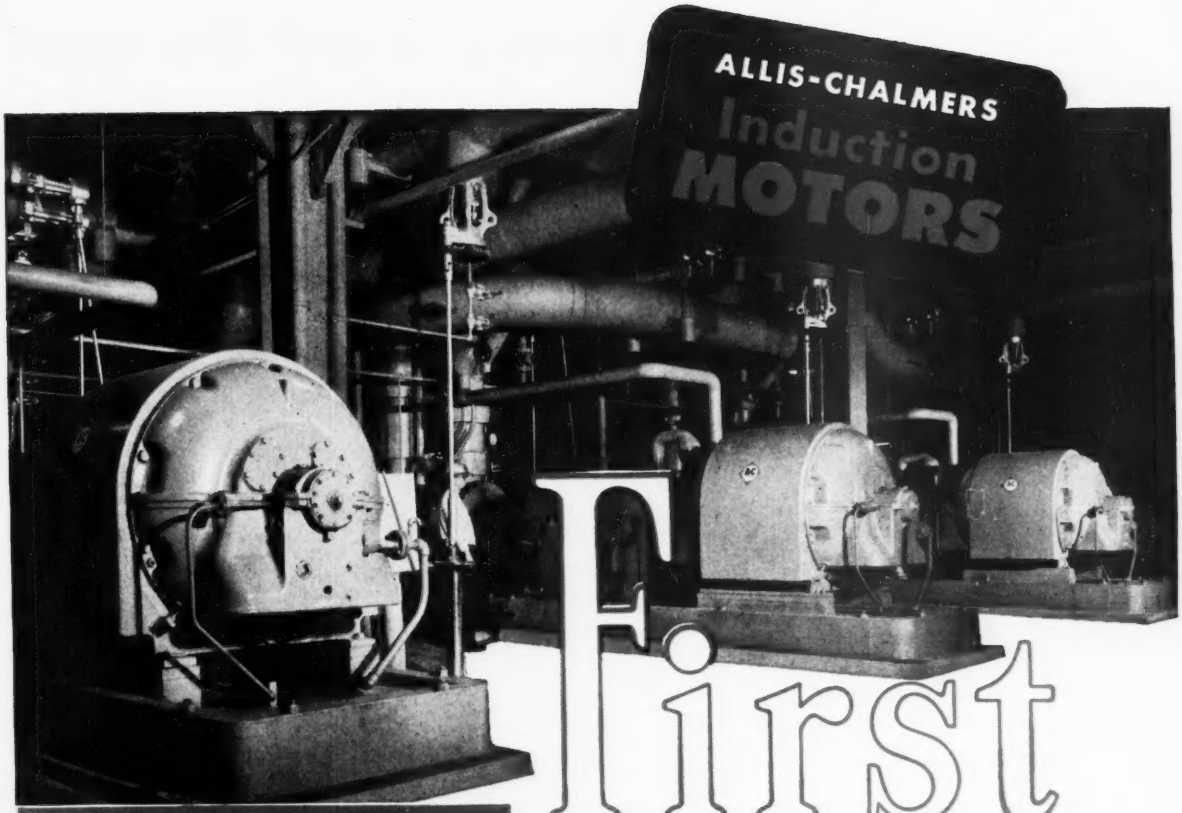
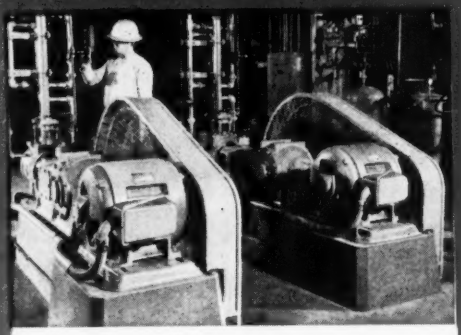


First

OF THREE TRIPLETS



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Drip-proof and splash-proof (End-shield bearing)	½ — 100 hp	51B6210
	15 — 800 hp	51B7693
	60 — 1750 hp	05B7542
Totally-enclosed fan-cooled (End-shield bearing)	½ — 100 hp	51B7225
	40 — 800 hp	51B7149
	125 — 3000 hp	05B7150
Two-pole — 900 hp and larger		05B7550
Large vertical		05B7629
Large pedestal-bearing		05B7771
Totally-enclosed water-cooled		05B7682
Weather-protected, for outdoor use		05R7874

These three 1500-hp, 3580-rpm boiler feed pump motors are the first of three such sets due for installation at Cincinnati Gas & Electric's Walter C. Beckjord station.

Large or small, the auxiliary drive motors for all three generating units at this new station will be Allis-Chalmers designed and built. The fact is, Cincinnati Gas & Electric learned thirty years ago that you can depend on A-C for reliable power plant auxiliary drives.

You can get auxiliary drive motors engineered to fit your requirements by calling in your A-C representative early in the planning stages. For design details, ask for the bulletins listed at the left. Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4058

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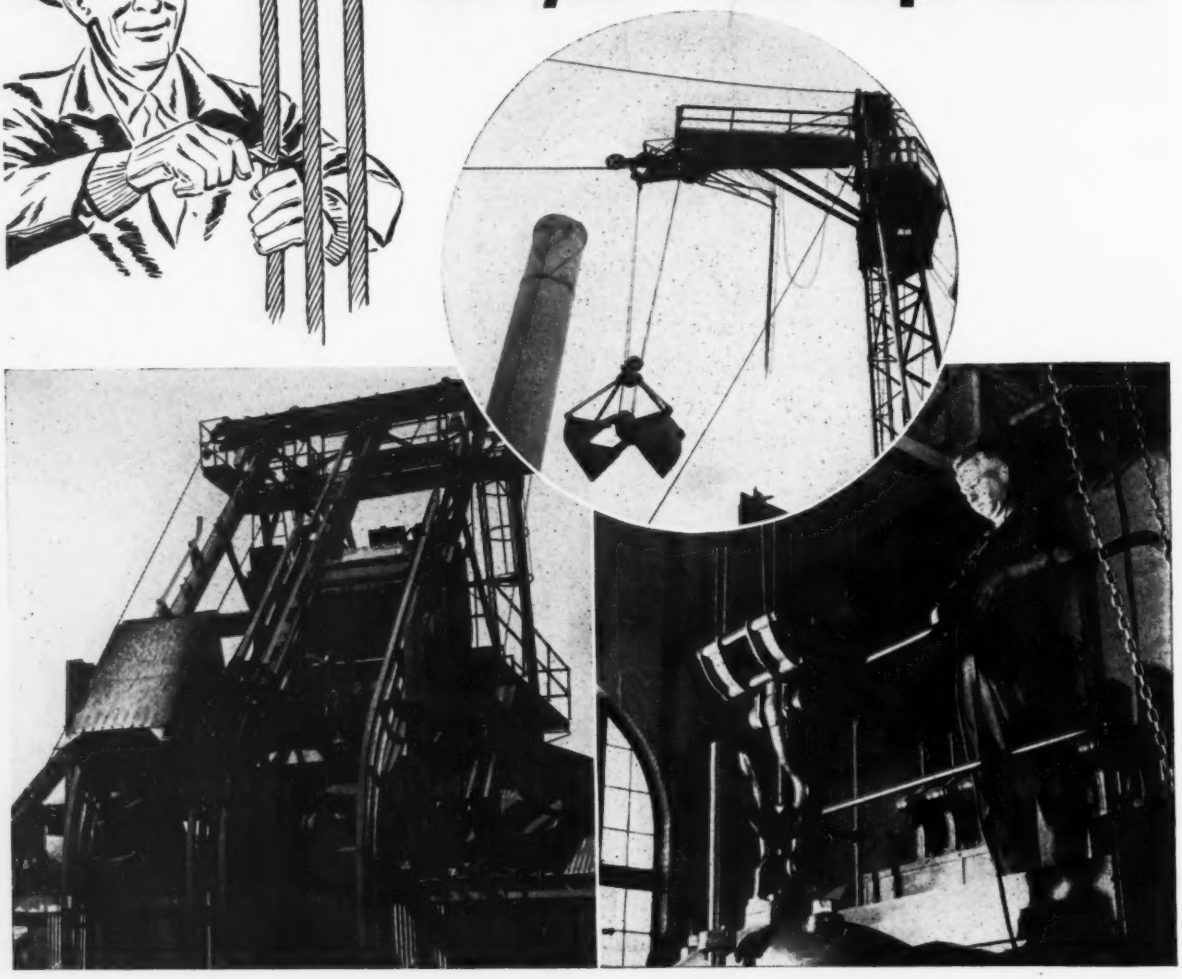

Even the best wire rope won't give maximum service unless it's the proper type and size for the job involved. If the wrong rope is used, it's apt to require replacing far too soon, with consequent needless expense.

In and around the power plant it is particularly important to select ropes carefully, for power-plant equipment is so specialized that the wire rope problems become a specialty in themselves.

We at Bethlehem offer every size, type, and grade of rope that is ever used in the power-producing field. But that isn't the whole story. Knowing the many technical factors involved, we are prepared to make a full and careful analysis of your rope applications; to make a thorough check of every detail, without cost or obligation on your part. If you are using the correct ropes — fine! If not, we'll be perfectly frank about it and recommend changes.

This can point the way to important savings. It can enable you to get a full return for every penny you spend on wire rope. It can help reduce premature rope wear and costly re-rigging and down-time.

Investigate Bethlehem rope for such machinery as car dumpers, ash-disposal units, skip hoists, cableways, scrapers, and turbine cranes. And by all means ask for the free on-the-spot analysis described above.

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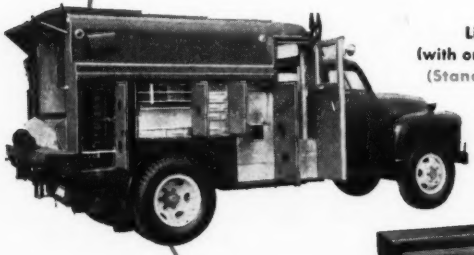
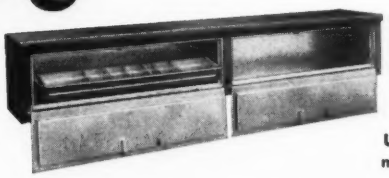


Line Construction Bodies
(with or without crew compartments)
(Standard or Low Floor Design)



Utility compartment assemblies

New Series 2100 all-hydraulic Aerial Ladder

Heavy-Duty Hydraulic Towers

Light Line Construction Bodies
(Standard or Low Floor Design)

General Service Bodies

HOLAN

The real significance of the name HOLAN on a Utility Body lies in the engineered manufacturing that incorporates the newest, the best and ALL of the special features which insure true "utility" to the user. Maximum usefulness, based on the line crew or servicemen's actual needs in each utility assignment, is engineered into every Holan unit . . . whether it's for light or heavy line construction, with or without crew compartments, with standard or low floor, pole handling rigs, towers, ladders, crew carriers or light general service bodies. The many utility companies using Holan equipment can tell you how this pays off on the job.

There are detailed spec sheets for every Holan unit

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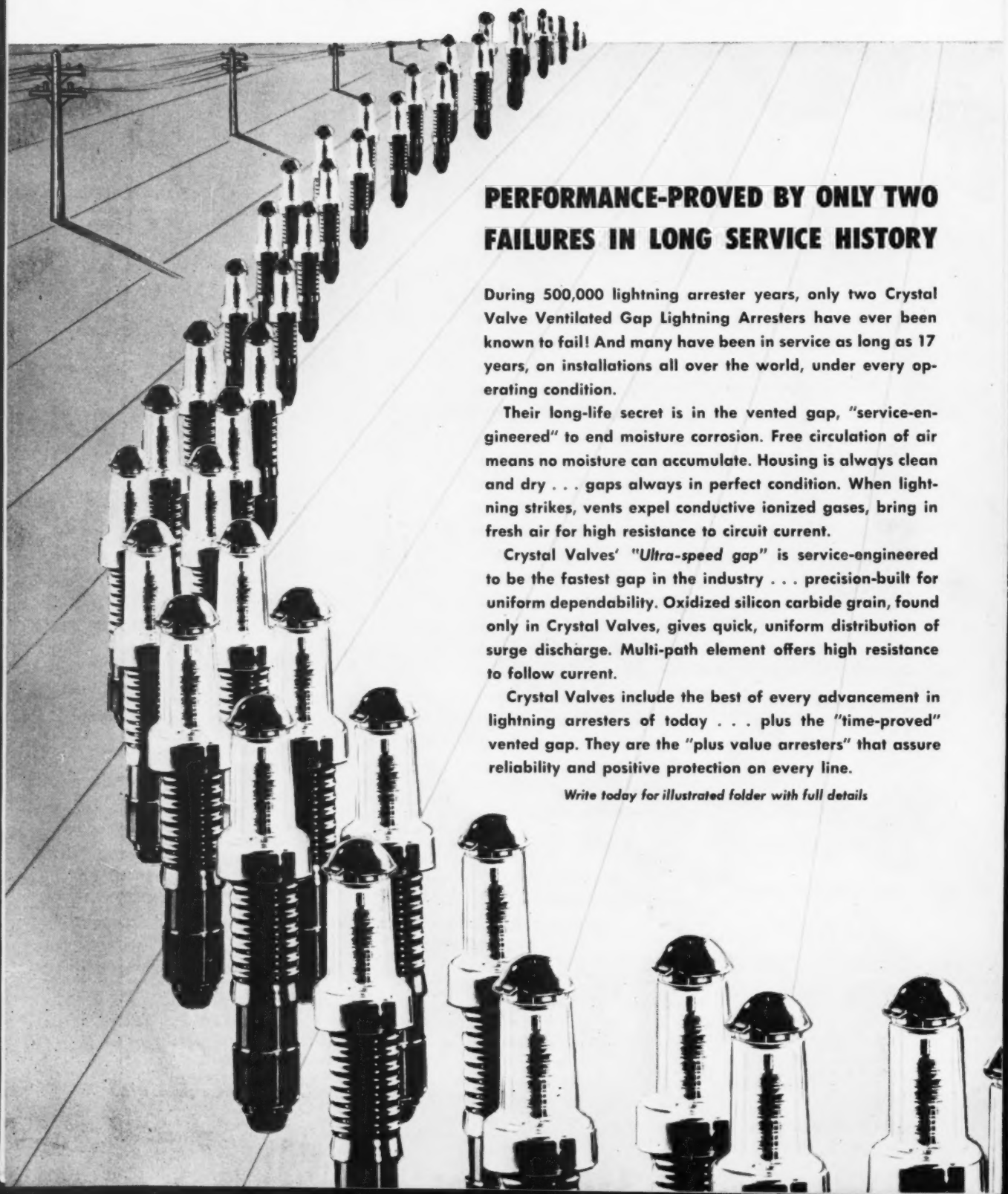
Only Two in



PERFORMANCE-PROVED BY ONLY TWO FAILURES IN LONG SERVICE HISTORY

During 500,000 lightning arrester years, only two Crystal Valve Ventilated Gap Lightning Arresters have ever been known to fail! And many have been in service as long as 17 years, on installations all over the world, under every operating condition.

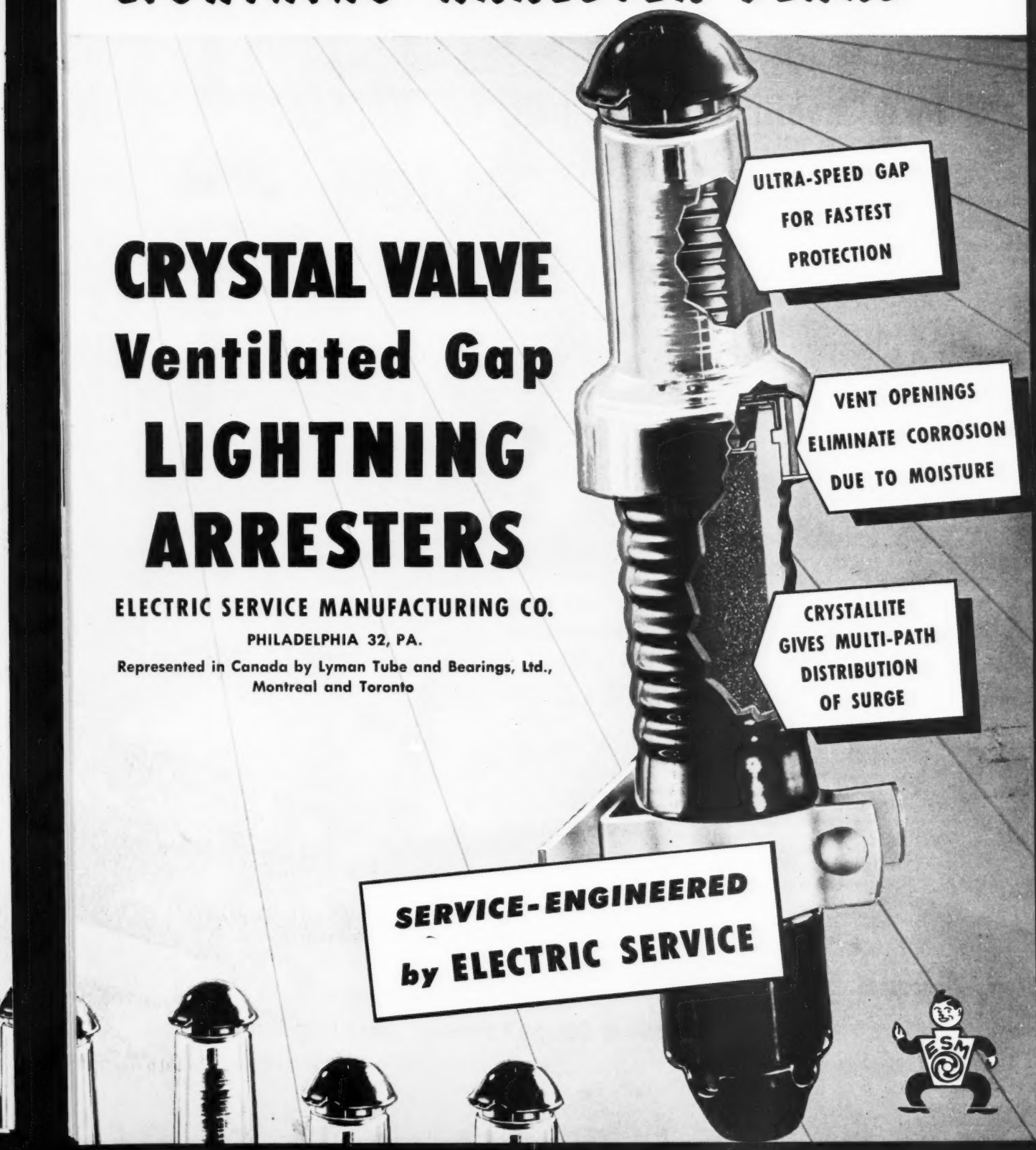
Their long-life secret is in the vented gap, "service-engineered" to end moisture corrosion. Free circulation of air means no moisture can accumulate. Housing is always clean and dry . . . gaps always in perfect condition. When lightning strikes, vents expel conductive ionized gases, bring in fresh air for high resistance to circuit current.

Crystal Valves' *"Ultra-speed gap"* is service-engineered to be the fastest gap in the industry . . . precision-built for uniform dependability. Oxidized silicon carbide grain, found only in Crystal Valves, gives quick, uniform distribution of surge discharge. Multi-path element offers high resistance to follow current.

Crystal Valves include the best of every advancement in lightning arresters of today . . . plus the "time-proved" vented gap. They are the "plus value arresters" that assure reliability and positive protection on every line.

Write today for illustrated folder with full details

500,000
LIGHTNING ARRESTER YEARS


ULTRA-SPEED GAP FOR FASTEST PROTECTION
VENT OPENINGS ELIMINATE CORROSION DUE TO MOISTURE
CRYSTALLITE GIVES MULTI-PATH DISTRIBUTION OF SURGE
SERVICE-ENGINEERED by ELECTRIC SERVICE
ESM

CRYSTAL VALVE
Ventilated Gap
LIGHTNING ARRESTERS

ELECTRIC SERVICE MANUFACTURING CO.

PHILADELPHIA 32, PA.

Represented in Canada by Lyman Tube and Bearings, Ltd., Montreal and Toronto

Here is the rugged FWD Light Duty LD, that's a great "go anywhere" unit for many general maintenance assignments.

FWD "Mobilized Tools" help you speed work, simplify service!

For more efficient line work choose from more than 78 perfectly matched combinations of truck, body and tools

Whether it's for line construction or maintenance, there's an FWD "Mobilized Tool" to meet your exact requirements. And your FWD dealer is prepared to offer you excellent service and supply on the complete unit.

When you buy FWD, you simplify purchasing, pinpoint responsibility. And, you're assured the service source that can competently service the complete "Mobilized Tool."

These installations illustrate only a few of the more than 78 matched combinations you can choose from. Ask your FWD dealer to give you all the facts . . . show you why an FWD is your best buy. He'll be pleased to help you select the right "Mobilized Tool" for your particular work.

THE FOUR WHEEL DRIVE AUTO CO.
Clintonville, Wis • *Canadian Factory*: Kitchener, Ont.

This sturdy FWD model HAU not only bores holes with the auger, but uses its integral derrick to set the pole.

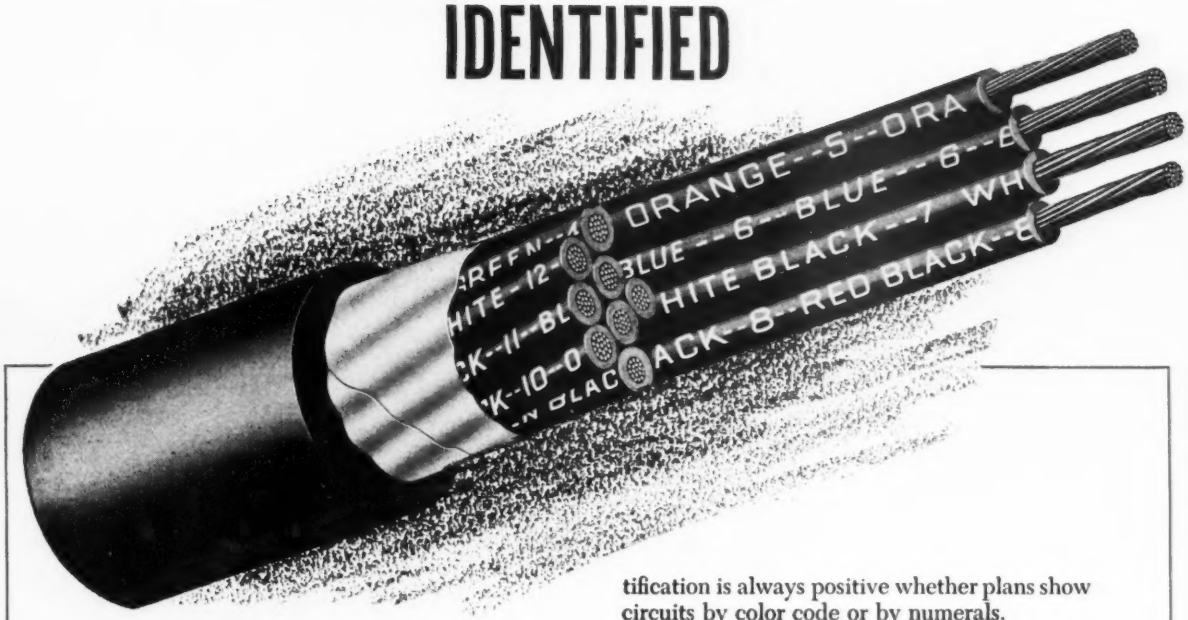
Equipped with ¾ line body, auger and tripod derrick, this FWD speeds line construction along the highway or cross-country.

This cab-over-engine FWD operates in really rugged country, frequently in extremely bad weather. Carries a crew of five . . . can be equipped for either maintenance or construction work.

Built by the makers of America's Foremost Heavy-Duty Trucks

Roeplastic control cable—

THE ONLY CONTROL CABLE WITH CIRCUITS *POSITIVELY* IDENTIFIED



THIS NEW Roebling ROEPLASTIC Control Cable makes circuit identification quick and certain for the first time in history. A workman can't go wrong even if he's color blind. Here's why:

In ROEPLASTIC Control Cable, each conductor is identified from end to end by both its IPCEA code color name and its individual number by means of an indelible printing against a strongly contrasting background. The printing is permanent; it cannot fade or rub off... identification is always positive whether plans show circuits by color code or by numerals.

Roebling ROEPLASTIC Control and Signal Cables are ideal for such purposes as remote control of motors, switch gear, automatic machinery, etc.... for traffic light control, relay, metering and supervisory circuits. They are made in constructions, types of insulations and over-all sheaths to meet every specific requirement. Write for technical data... and order ROEPLASTIC Control and Signal Cables from your Roebling distributor. John A. Roebling's Sons Corporation, Trenton 2, N. J.

Subsidiary of The Colorado Fuel and Iron Corporation

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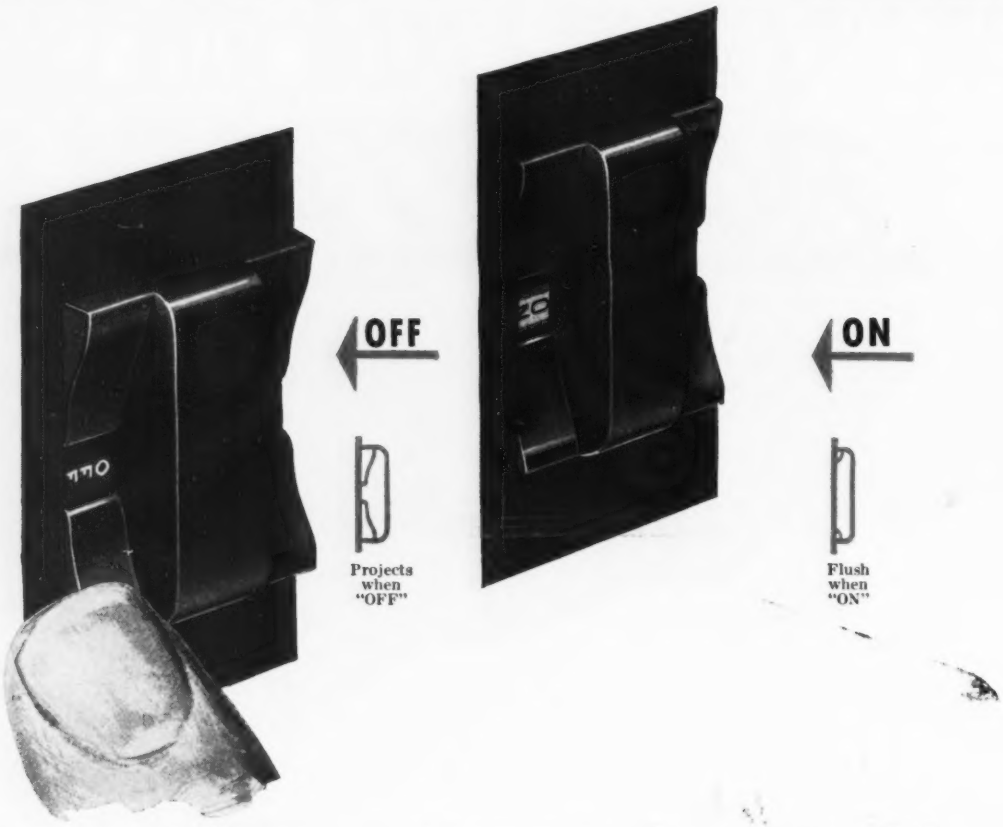
BULLDOG *Pushmatic* ELECTRI-CENTER



Lets your finger "see" the trouble

Nothing so dramatically points up the trouble-free simplicity and safety of the BullDog Pushmatic Electri-Center as the features illustrated above.

When a circuit is overloaded, and the Pushmatic automatically clicks "OFF" — the "OFF" button projects beyond the "ON" buttons. This means that the button reading "OFF" can be easily located by *touch* — even in the dark.

When the trouble has been corrected, you simply push the button, it clicks to "ON" — and current is restored. With a BullDog Pushmatic Electri-Center installed, service calls to reset breakers or to replace fuses, *end*. Designed for today's "Appliance-Age" homes, modern Electri-Centers of thoroughbred quality, provide spare circuits to cover all future needs. They are available from 2 to 42 circuits.

Write today for free bulletin PM-355, giving complete details on Pushmatic circuit breakers and Electri-Center panelboards. BullDog Electric Products Company, Dept. WD53, Detroit 32, Mich.

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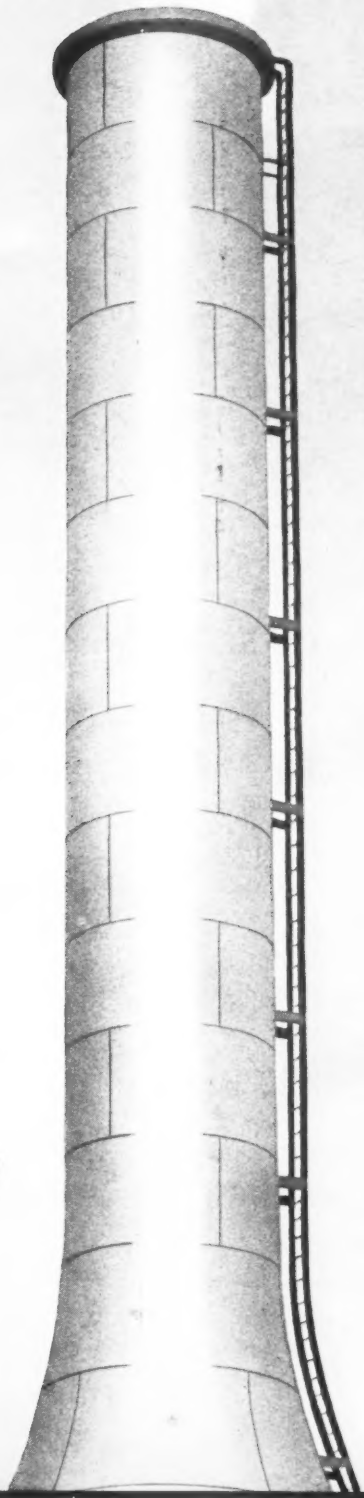
BULLDOG
ELECTRIC PRODUCTS COMPANY

American Blower . . . a time-honored name in air handling



Look at the almost total absence of fly ash from this stack. This is due to an American Blower Fly Ash Precipitator. On a given application, as the load falls off and fly ash becomes harder to catch, this precipitator automatically maintains a higher efficiency than any other collector of mechanical type.

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Memo to Power Plant Men:

You can handle more gas per revolution at lowest tip speed with Sirocco Multi-Blade Fans than with any other type. Designed and proportioned especially for induced draft work, their operating characteristics make them particularly adaptable to your modern power plant needs.

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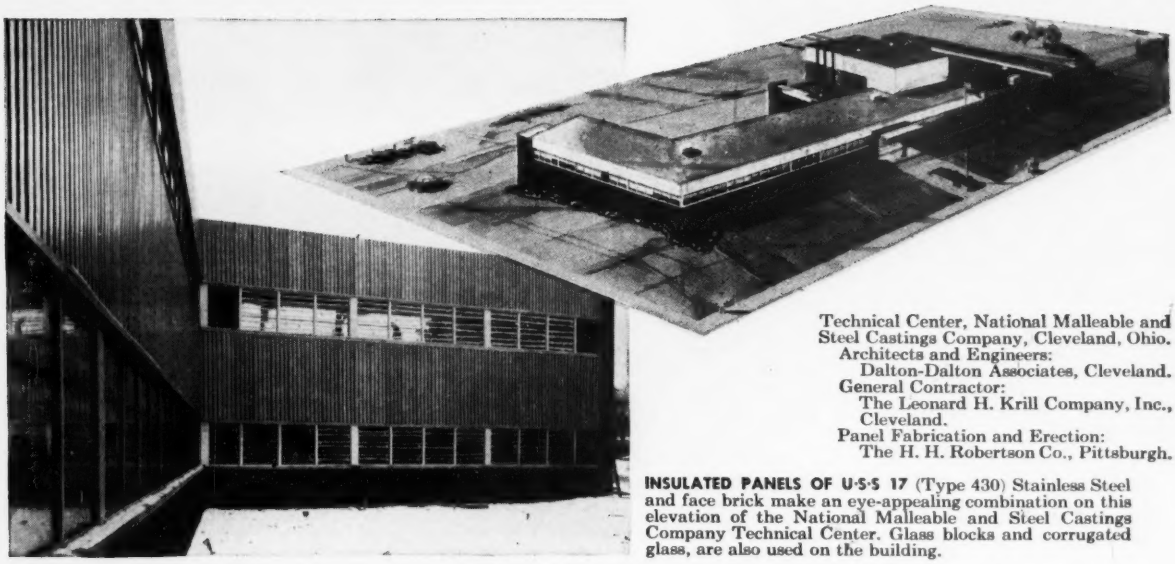

Technical Center, National Malleable and Steel Castings Company, Cleveland, Ohio.
Architects and Engineers:
Dalton-Dalton Associates, Cleveland.
General Contractor:
The Leonard H. Krill Company, Inc., Cleveland.
Panel Fabrication and Erection:
The H. H. Robertson Co., Pittsburgh.

INSULATED PANELS OF U·S·S 17 (Type 430) Stainless Steel and face brick make an eye-appealing combination on this elevation of the National Malleable and Steel Castings Company Technical Center. Glass blocks and corrugated glass, are also used on the building.

New Technical Center takes advantage of insulated panels of U·S·S 17 Stainless Steel

IF you're looking for striking beauty that time and weather won't affect, insulated panels of U·S·S 17 (Type 430) Stainless Steel are the logical choice for your new building, no matter what its function may be.

For example, National Malleable and Steel Castings Company, Cleveland, Ohio, constructed its new office and laboratory building with Stainless Steel panels used in combination with face brick, glass block and heat-absorbing corrugated glass.

Approximately 9,000 square feet of the wall surface of the new National Technical Center is Stainless Steel. In addition to their striking appearance, these panels will yield many other benefits, both during erection and after occupancy.

Since the structure is completely air-conditioned, the low coefficient of thermal transmission ("U" factor) of these insulated panels is extremely important. Erection took place in midwinter, without regard to weather conditions. Initial cost is well in line with comparable materials and its low maintenance cost will save money throughout the long life of the building.

For full information on this modern material of construction, send for our new book containing the latest data on construction with panels of U·S·S 17 Stainless Steel.

United States Steel Corporation
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☐ Please send me your new booklet on U·S·S 17 Stainless Steel for industrial buildings.
☐ Please arrange to have fabricators of Stainless Steel wall panels send me literature on their particular type of construction.

Name.....Title.....

Address.....

City.....State.....

United States Steel produces only the Stainless Steel sheet and strip from which panels of this type are made; the panels themselves are fabricated by a number of our customers.

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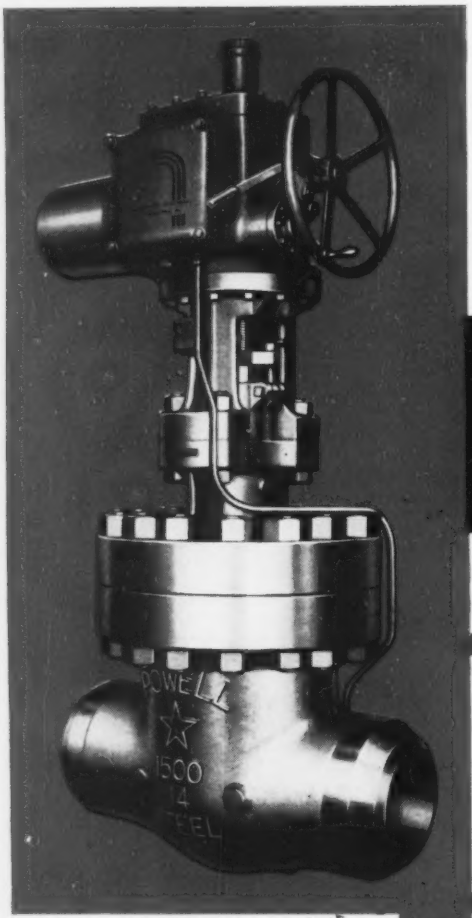
U·S·S STAINLESS STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

3-805-A

UNITED STATES STEEL



With

LIMITORQUE® REMOTE CONTROL

One man can operate any number of Valves, at any distance, from a push button station centrally located.

A Philadelphia Engineer will gladly call and help you with your valve operating problems. Write us now.

Limitorque makes possible the centralized operation of valves in remote or hazardous locations from convenient and strategically placed control panels. Thus, this vital plant operating procedure can be handled by key employees, and is not dependent upon brawn alone.

Limitorque opens and closes any type of valve quickly and dependably. Valve stems, seats, discs, plugs and gates are fully protected from damage during closing cycle by the torque limiting mechanism. There are *many* exclusive design and construction features in Limitorque Controls, which are reasons for the world-wide preference for these "proved" Valve Operators.

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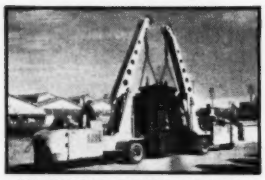
Industrial Gears and Speed Reducers
LimiTorque Valve Controls

UNSURPASSED FOR

LOADING GONDOLAS

LOADING VAN TRUCKS



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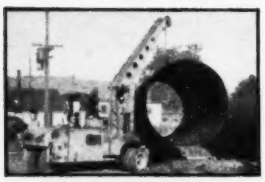

EMERGENCY LIFTING

CLOSE QUARTER OPERATIONS

5th NATIONAL
MATERIALS HANDLING EXPOSITION
MAY 18-22, 1953
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HYSTER

The more you use it...the more uses you find for it!

The Hyster Karry Krane rides smoothly on big pneumatic tires, and handles as easily as a truck. Gasoline-engine driven. Conventional controls. Turns around within its own length!

HYSTER KARRY KRANE®

10,000 LBS. CAPACITY

"I've bought my third Karry Krane, and I still don't have one around, because other departments keep borrowing it. I'm going to order another," one superintendent* says, and many companies have this experience after buying a Karry Krane.

If you have yard operations of any sort, loading or unloading gondolas or flatcars, large bulky objects to handle and store, the Hyster Karry Krane is your most profitable solution. Because it handles load units not profitably handled by other types of materials handling equipment, the Karry Krane is a perfect complement to any lift truck fleet operation.

The Hyster Karry Krane costs little to operate. It pays for itself in a short time, depending on the operation, then keeps on saving and making money for you afterwards. With a Karry Krane on your premises, you can be sure of handling any tough load profitably. *For details, write today for Catalog 1236 to:*

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*name on request

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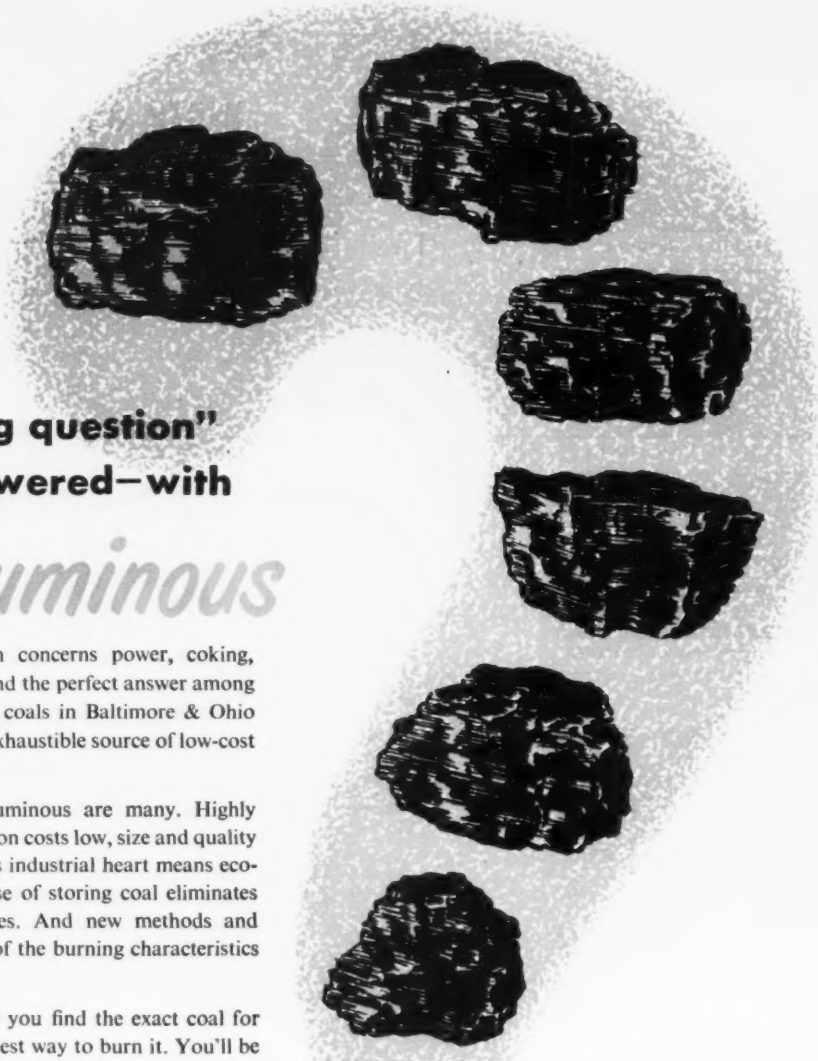
HYSTER COMPANY FOUR PLANTS: Portland, Oregon • Peoria, Illinois • Danville, Illinois • Nijmegen, The Netherlands



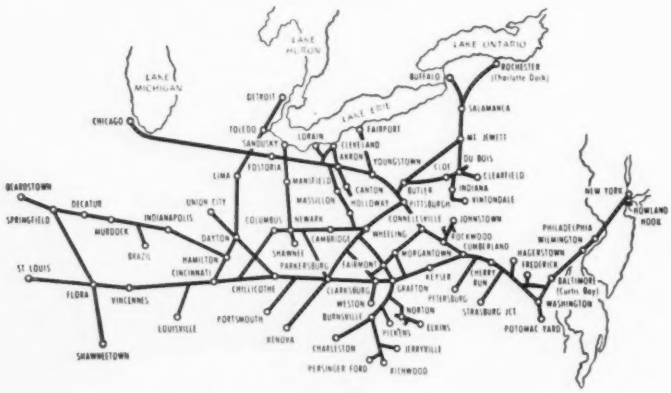
Your "burning question" is quickly answered—with

B&O Bituminous

Whether your specific question concerns power, coking, steam, or space heating, you'll find the perfect answer among the wide variety of Bituminous coals in Baltimore & Ohio territory. Here lies an almost inexhaustible source of low-cost heat and energy.

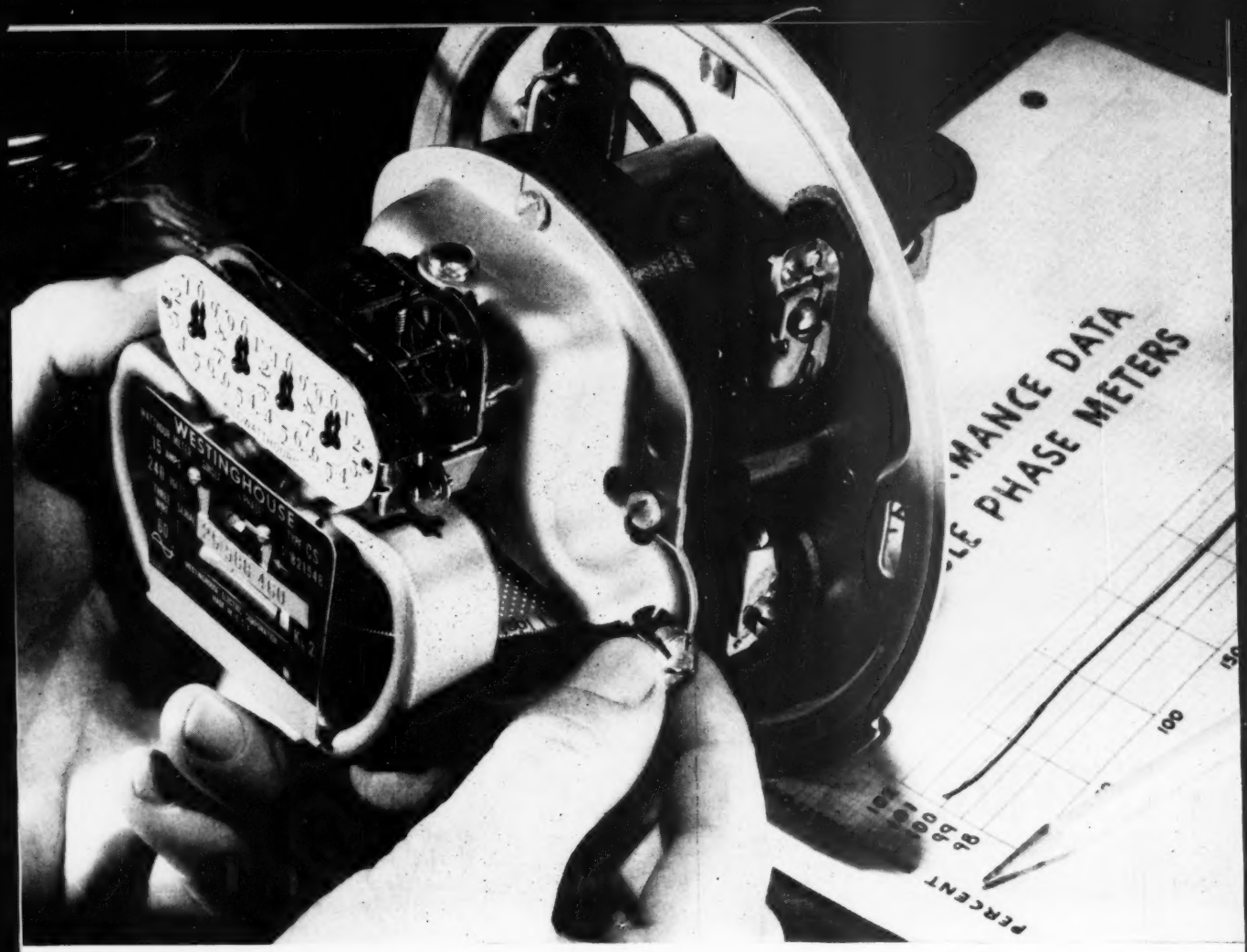
The benefits of B&O Bituminous are many. Highly mechanized mines keep production costs low, size and quality uniform. Closeness to America's industrial heart means economical transportation. The ease of storing coal eliminates the need for expensive facilities. And new methods and devices take further advantage of the burning characteristics of Bituminous.

ASK OUR MAN! He will help you find the exact coal for your purpose, and explain the best way to burn it. You'll be amazed at the efficiency, economy, and cleanliness of B&O Bituminous today.



BALTIMORE & OHIO RAILROAD

Bituminous Coals for Every Purpose



NEW WESTINGHOUSE ADJUSTMENT DESIGN

makes for quicker, easier calibration

A new light-load adjuster and full-load adjuster in Westinghouse single-phase watthour meters make adjustments quicker and easier. Here's why . . .

An improved light-load adjuster

A knob is now cast on the end of the light-load adjuster which permits you to make adjustment by hand or with screw driver. For convenience, adjustment can be made from either the front or the side. This is very convenient when meters are mounted close together as in gang testing.

A superior full-load adjuster

Here, the introduction of a tiny nylon plug takes all the work out of full-load adjustment and still locks the adjuster screw firmly in place. This is a real timesaver. The nylon is springy, compressible and durable and it exerts constant pressure to hold the adjuster shaft firmly. Yet you can also turn the adjustment wheel against the pressure to adjust the full load directly.

Get more facts on Westinghouse meters

Easier calibration is one of many important features in Westinghouse meters. Get more facts. Write for "What it takes for long-time, low-cost metering", B-4665, a highly informative booklet that discusses the theory and practice of sound metering. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-40444

Everything you need
in meters and instruments

YOU CAN BE **SURE**...IF IT'S

Westinghouse

CHEVROLET ADVANCE-DESIGN TRUCKS

Famous for Their Saving Ways

—and here are 4 Powerful Reasons why!

EXTRA POWER! How can extra power save you money? The high-compression power (7.1 to 1 ratio) of Chevrolet's Loadmaster engines in heavy-duty trucks means extra power and extra miles from each gallon of gas. Chevrolet's Thriftmaster engine in light- and medium-duty models has long been known for economy of operation.

EXTRA STAMINA! Heavier, stronger construction throughout, more rigid frames! Now, Chevrolet trucks are sturdier and tougher than they have ever been in the past—better able to handle the roughest jobs day after day, months on end. Such outstanding stamina is one more factor—and an important one—in reducing your hauling costs.

MATCHED TO THE JOB, TOO! Every Chevrolet truck is carefully engineered and *factory-matched* to the job it will do. You don't buy too big a truck. You don't buy too small a truck. You get a truck with every unit matched and balanced to the work it will do—and that saves you money, too.

EXTRA OVER-ALL ECONOMY! Many things contribute to lower hauling costs with Chevrolet. But, few are as welcome news to buyers as the fact that Chevrolet trucks list for less than any other truck of comparable size and capacity. See your Chevrolet dealer. Chevrolet Division of General Motors, Detroit 2, Michigan.

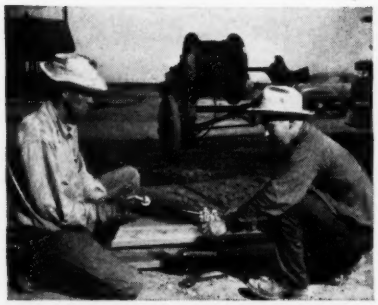
CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

TWO GREAT VALVE-IN-HEAD ENGINES—the Loadmaster or the Thriftmaster—to give you greater power per gallon, lower cost per load. **POWER-JET CARBURETOR**—for smooth, quick acceleration response. **DIAPHRAGM SPRING CLUTCH**—for easy-action engagement. **SYNCHRO-MESH TRANSMISSION**—for fast, smooth shifting. **HYPOID REAR AXLE**—for dependability and long life. **TORQUE-ACTION BRAKES**—on light-duty and medium-duty models and on front of heavy-duty models. **TWIN-ACTION REAR BRAKES**—on heavy-duty models. **DUAL-SHOE PARKING BRAKE**—for greater holding ability on heavy-duty models. **CAB SEAT**—with double deck springs for complete riding comfort. **VENTI-PANES**—for improved cab ventilation. **WIDE-BASE WHEELS**—for increased tire mileage. **BALL-GEAR STEERING**—for easier handling. **UNIT-DESIGNED BODIES**—for greater load protection. **ADVANCE-DESIGN STYLING**—for increased comfort and modern appearance.

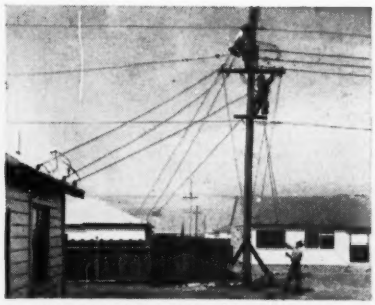
CHEVROLET
first in demand
in value
in sales

Count the advantages

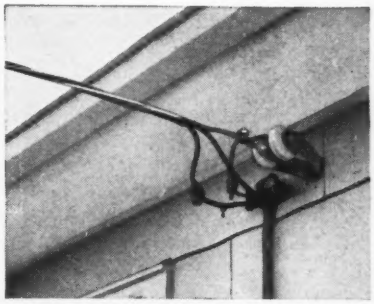
WHEN YOU SPECIFY ALUMINUM CONDUCTOR



1. LOWER COSTS—Aluminum costs far less than copper; thus, automatically provides important savings. And because aluminum weighs so much less than copper, handling costs are less.



2. EASIER INSTALLATION—The light weight of aluminum conductor makes it easier for crews to handle, string, move around on the job. This insures faster, lower cost installations.



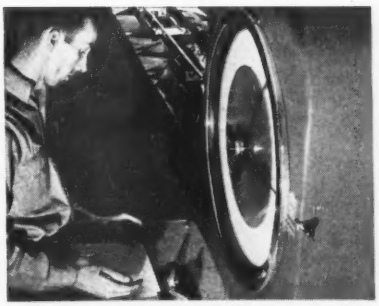
3. LESS MAINTENANCE—Aluminum's lightness puts less strain on house, pole, fittings—reduces maintenance. *Total* savings with aluminum conductor can be as much as *35 per cent!*

Count the extra advantages

WHEN YOU SPECIFY KAISER ALUMINUM CONDUCTOR

1. FIELD SERVICE—Installation experts from Kaiser Aluminum work with crews, demonstrate newest techniques, help reduce costs. Their familiarity with schedules helps maintain Kaiser Aluminum's unsurpassed record for *on-time delivery!*

2. ENGINEERING SERVICE—Meetings with crews are conducted by Kaiser Aluminum engineers. Studies are made to help solve specific problems. They help coordinate specifications, purchases, designs, and furnish sag and tension charts on request.



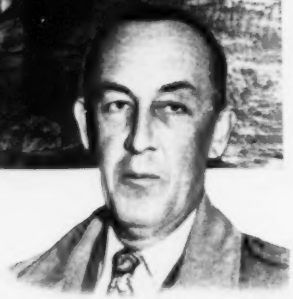
3. LABORATORY SERVICE—Always available to customers are the services of Kaiser Aluminum's own laboratory. It's one of the best-staffed and best-equipped laboratories in the industry. This research helps assure maximum quality, service, economy.

THE EXTRA advantages of *complete service* are yours at no obligation when you specify Kaiser Aluminum conductor. *Act now!* A letter or telephone call is all that's required. Also request free pamphlet giving complete engineering data on new Kaiser Aluminum covered conductor—both weatherproof line wire and self-supporting Triplex cable for service drops and secondary distribution lines. Contact any Kaiser Aluminum office in principal cities, or one of our many distributors. Kaiser Aluminum & Chemical Sales, Inc., Oakland 12, California.

Kaiser Aluminum

setting the pace . . . in growth, quality and service

NEOPRENE AND POLYETHYLENE COVERED CONDUCTOR, SOLID AND STRANDED • SELF-SUPPORTING TRIPLEX CABLE • ACSR • ALL ALUMINUM CONDUCTOR



"I can vouch for Dodge stamina and maneuverability"

Why new DODGE *"Job-Rated"* TRUCKS are *ideal* for public utilities

Fast and lively on the go!

Seven brawny engines . . . from 100 to 171 h.p. . . . three of them *all-new*. You can be sure the Dodge you choose will deliver all the power you need—and *then* some! And when it comes to handling, you can turn tighter, park easier, wheel around with less effort, thanks to short wheelbases and wide treads. What's more, new no-shift Truck-o-matic transmission *does your gearshifting for you* . . . saves extra energy for the work at hand! Available on all ½- and ¾-ton models.

Running costs stay mighty low!

Just buy a Dodge *"Job-Rated"* truck and watch those operating and upkeep costs go down. Chrome-plated top rings, 4-ring pistons and high compression ratios help limit your gas and oil bills. *"Job-Rated"* design means your Dodge will last longer with less time out for repairs. Find out about the more than fifty new features from your friendly Dodge *"Job-Rated"* truck dealer. You'll discover that your time is profitably invested.

. . . *says* **JOHN J. DOYLE,**
Street Commissioner, Scarsdale, N. Y.

"Public utility trucks must be ready to go, night and day, on any kind of routine job or emergency. For routine work, we demand continuously high performance and economy . . . while for emergency calls, the watchword for our utility trucks is complete dependability under all conditions. We find that Dodge *'Job-Rated'* trucks answer our requirements to perfection!

"The stamina and high degree of maneuverability of these units are put to the test daily in our public utility work, and I can vouch for the fact that our Dodge *'Job-Rated'* trucks pass with flying colors. We feel that they are excellent all-round units!"

DODGE
"Job-Rated" TRUCKS

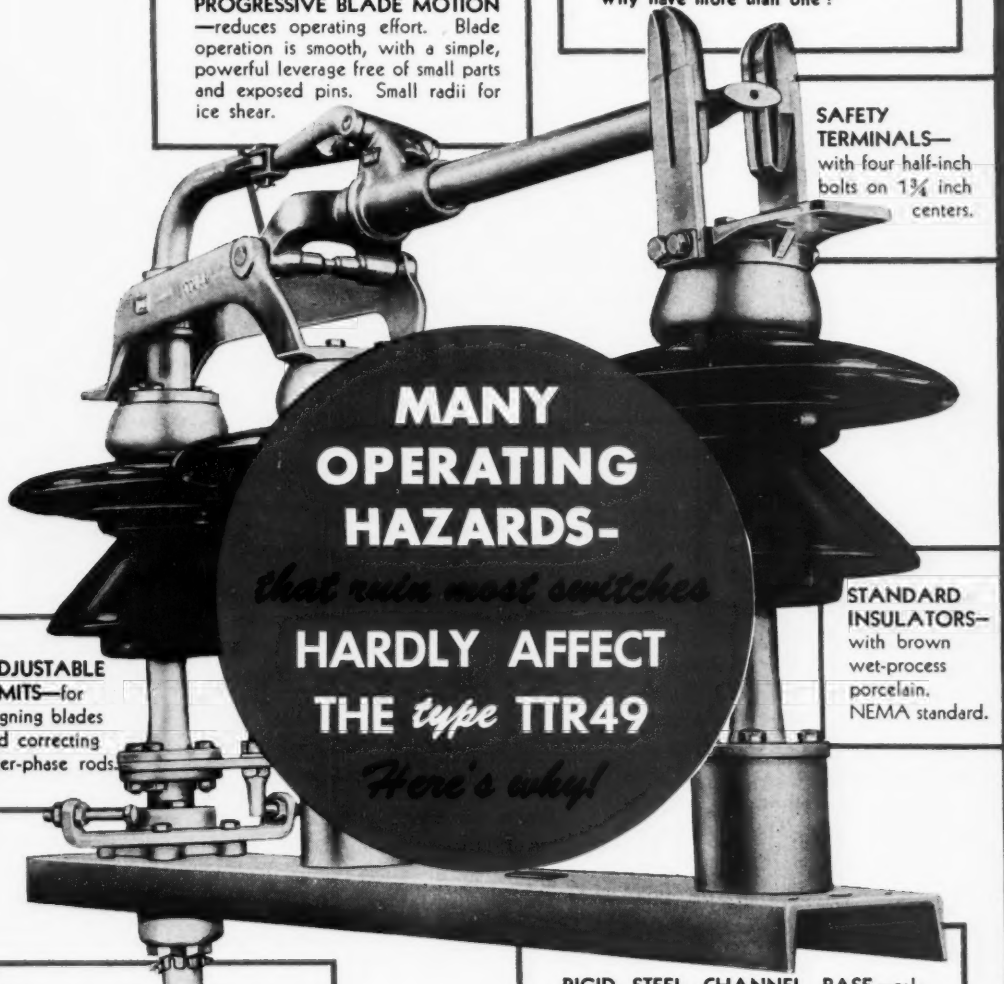
Check all the facts...

SEALED PRESSURE HINGE CONTACTS—always protected and clean—ELIMINATING A SECOND MAKE-AND-BREAK. Continuous, annular, constant electrical contact—NO POSSIBILITY OF ARCING OR BURNING. More than twice the momentary rating of the switch fails to mark the contacts—ELIMINATING ANY NECESSITY FOR INSPECTION—and R&IE Enclosed, Protected Contacts REQUIRE NO BY-PASSING OF ANY PART OF THE HINGE.

HI-PRESSURE CONTACT—of necessity a make-and-break. This R&IE design, now generally adopted, is most reliable for this critical point. Most effective and efficient construction is beryllium copper, with its inherent spring pressure and NO BACK-UP SPRINGS, plus copper fingers for high thermal capacity. High momentary tests prove it, YET IT IS MORE VULNERABLE TO HAZARDS THAN A PROTECTED CONTACT. **Why have more than one?**

PROGRESSIVE BLADE MOTION—reduces operating effort. Blade operation is smooth, with a simple, powerful leverage free of small parts and exposed pins. Small radii for ice shear.

SAFETY TERMINALS—with four half-inch bolts on 1¾ inch centers.



MANY OPERATING HAZARDS-

that ruin most switches

HARDLY AFFECT THE *type* TTR49

Here's why!

ADJUSTABLE LIMITS—for aligning blades and correcting inter-phase rods.

STANDARD INSULATORS—with brown wet-process porcelain. NEMA standard.

ALL-WEATHER DRY BEARING—for trouble-free operation. weather-sealed, stainless ball bearings on bronze races. Adjustable take-up nut. Galvanized, forged steel rotor.

RIGID STEEL CHANNEL BASE—galvanized and punched for any standard mounting. Structural steel for high strength.

I-T-E R&IE

R&IE EQUIPMENT DIVISION

I-T-E CIRCUIT BREAKER CO.

GREENSBURG, PA.

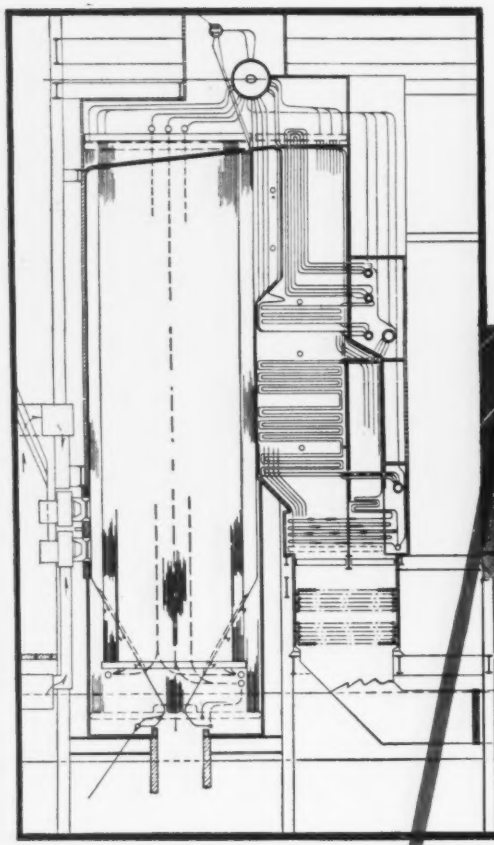
The Check List

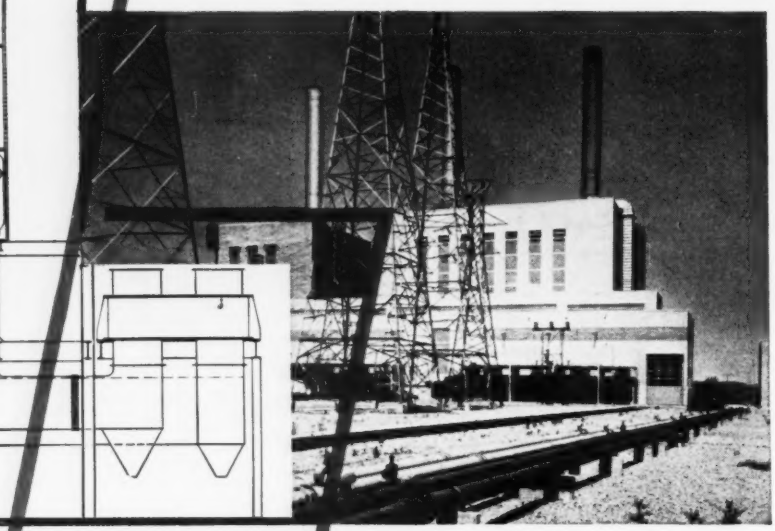
- CONDUCTOR SUPPORTS, CLAMPS AND FITTINGS
- DISCONNECTING SWITCHES INDOOR AND OUTDOOR
- HORN GAP SWITCHES
- INTERRUPTER SWITCHES
- CUTOUTS AND THERMO-RUPTERS
- DISTRIBUTION EQUIPMENT
- SWITCH OPERATING MECHANISMS
- SUBSTATIONS
- OPEN OR ENCLOSED, ISOLATED PHASE HEAVY DUTY BUSES
- KIRK INTERLOCK SYSTEMS
- AUTOMATIC SWITCHING EQUIPMENT
- METAL CUBICLES
- TESTING DEVICES

Million Pound Boiler at Sunbury Station of the Pennsylvania Power & Light Company

equipped with

LJUNGSTROM AIR PREHEATER





The latest addition to the Pennsylvania Power & Light Company's new Sunbury Station is a unit that adds 125,000 kilowatts to this utility's power output and increases the Station's capacity to over 400,000 kilowatts. The station was designed by Ebasco Services, Inc. under the utility's supervision, and built by the latter.

The reheat boiler for this unit was furnished by Foster Wheeler Corporation. It is fired by pulverized coal and has a capacity of 1,000,000 pounds of steam per hour at 1525 psi and 1005 F., reheated to 1005 F.

This Foster Wheeler boiler incorporates a Ljungstrom Air Preheater, which preheats combustion air to 543 F., and cools exit gas to 281 F.

Since the war, the total capacity of steam generating units equipped with Ljungstrom Air Preheaters — installed, under construction or on order in industrial and utility plants throughout the country — comes to well over 285,000,000 pounds of steam per hour. Every boiler manufacturer has included Ljungstrom Air Preheaters in prominent installations made during this period.

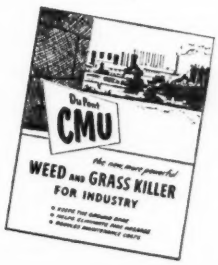
THE Air Preheater Corporation 60 East 42nd St., New York 17, N. Y.

Powerful Du Pont CMU kills weeds and grass and prevents regrowth

Save labor and simplify weed and grass control with Du Pont CMU. As little as 1 to 1½ pounds per 1000 square feet . . . 40 to 60 pounds per acre . . . can get rid of weeds and grass for an entire growing season or longer. It gives you new efficiency in cutting down maintenance and fire problems caused by unwanted vegetation. Use CMU around power plants, substations, pole yards, signs and parking areas.

- Kills most kinds of weeds and grass and prevents regrowth. It works through the roots . . . just spray it on the ground.
- Eliminates fire hazards caused by unwanted vegetation.
- Saves work. One easily applied spray takes the place of laborious hand cutting, mowing, spreading of bulky chemicals or use of repeated weed sprays.
- Cuts maintenance and depreciation costs. Prevents weeds from fouling up equipment, keeps the way clear for outdoor work of any kind. Destroys cover for rodents and other vermin.
- Non-flammable, non-volatile, non-corrosive. Comes as a wettable powder to mix with water.

TO GET THIS BOOKLET SHOWING RESULTS WITH CMU, *fill in coupon at right.*



DU PONT
REG. U. S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.) C-5
Grasselli Chemicals Department
Wilmington, Delaware

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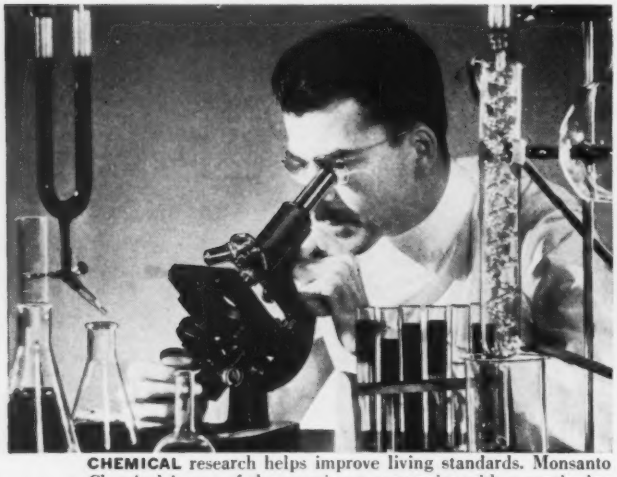
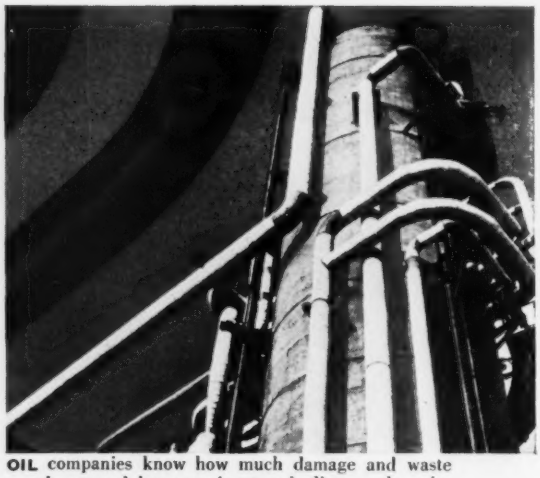
Firm_____
Street_____
City_____ State_____



CHEMICAL research helps improve living standards. Monsanto Chemical is one of the prominent companies with a continuing research program. Monsanto is also one of the companies EBASCO has been privileged to serve with engineering and market study services.



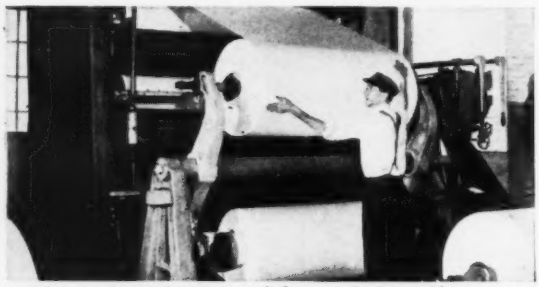
OIL companies know how much damage and waste can be caused by corrosion to pipelines and equipment. EBASCO has served Trans-Northern Pipe Line Company of Canada through corrosion surveys and application of various methods of corrosion control.

MANY DIFFERENT INDUSTRIES SOLVE INSIDE PROBLEMS WITH OUTSIDE HELP

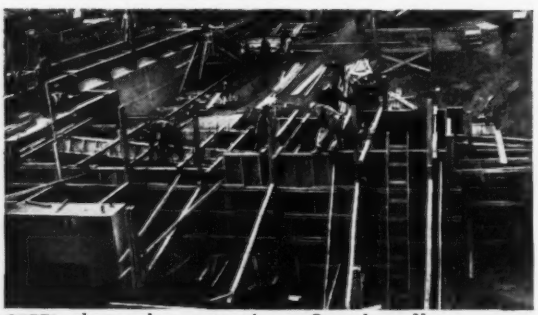
Modern industrial expansion often creates special situations that demand special services. That's where EBASCO is able to assist many kinds of businesses and industries across the nation and around the world.

EBASCO keeps its services in step with the times. They are geared to meet the exacting requirements of today's new processes, new technologies, new horizons. Such knowledge is a must in serving industries like those shown on this page.

If your business faces a special problem, the services EBASCO offers may well be your answer. Our booklet, "The Inside Story of Outside Help," describes these services. May we send you a copy? Just write or phone Ebasco Services Incorporated, Dept. M, Two Rector Street, New York 6, N. Y.



PULP & PAPER industry growth has resulted in wide expansion of production facilities. Rayonier Incorporated, a leader in the industry, engaged EBASCO to design and construct its $25,000,000 chemical cellulose mill in Jesup, Georgia.



STEEL plant under construction at Owensboro, Kentucky. The design and construction is being handled by EBASCO for the Green River Steel Corporation. This plant is scheduled for completion this year.

GAS pipeline of the East Tennessee Natural Gas Co. under construction. This pipeline, now in operation, carries natural gas from Greenbrier, Tenn., to the Atomic Energy Plant at Oak Ridge. EBASCO was engaged to handle the entire project from preliminary planning to "in service" operation.

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BUSINESS CONSULTANTS

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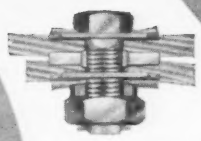
SAFEGUARD YOUR ALUMINUM!

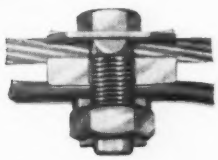
Use These Tried-and-Proved Fittings

"Use Aluminum on Aluminum"

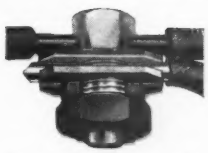
Type CA — All-aluminum nut and bolt anodized to prevent corrosion — Extra thick contoured spacer washer of heavily tin-plated copper, separates conductors—Excellent for Aluminum-Copper combinations.



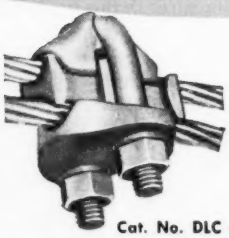
Type AAW — For Al. to Al. — All-aluminum connector with 2 bell-mouthed washers and aluminum contour spacer to hold wires in shape. Alumilite treated.



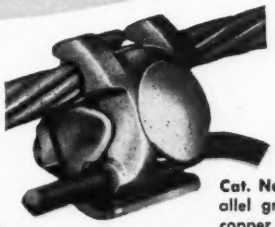
Type HPW — Tin-plated Duronze connector for Al. to Cu. or Al. to Al.



Type H-3-W — Primarily for 4, 6 and 2 Al. tap to Cu. line. Duronze connector with tin-plated bolt and 2 grooved bi-metallic washers.



Cat. No. DLC 6-0 — Aluminum dead end loop clamp, covers wire range 6 — 1/0 ACSR.



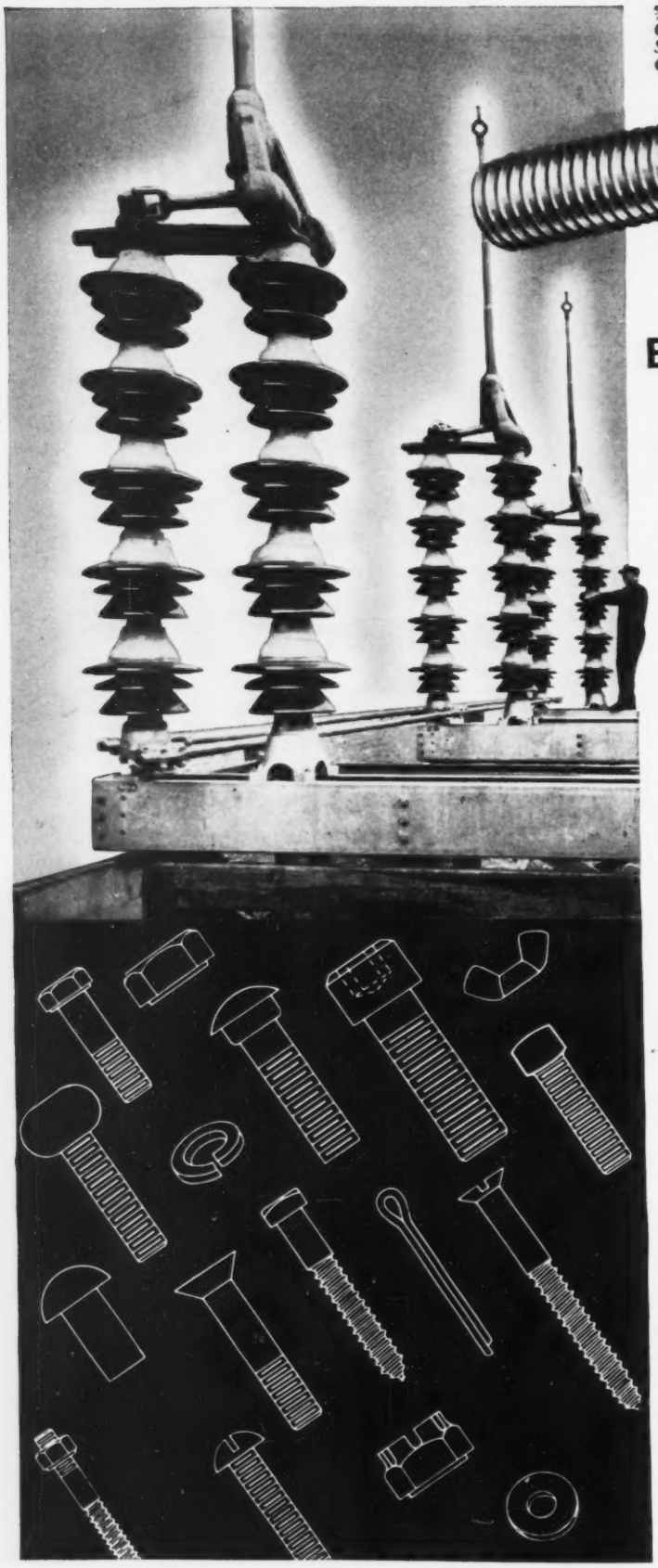
Cat. No. PAC 6-0 — Parallel groove clamp with copper liners soldered to aluminum body on one side. Also made for Al. to Al. and for armor rod.

Always specify BLACKBURN Hi-Strength Connectors & Fittings
They'll Give You Years of Trouble-Free Service . . . Send for Samples Today

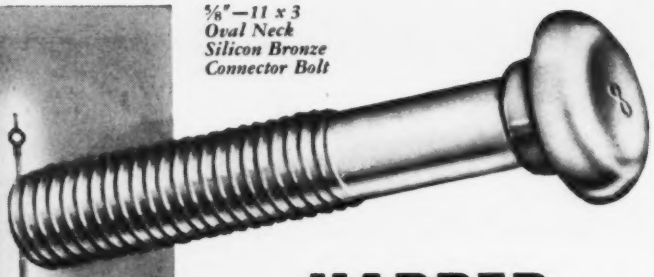
ALL BLACKBURN Connectors and Clamps for Aluminum conductor are designed to protect the conductor against crushing as well as against electrolysis. Yet these same fittings have extra gripping ability to produce a tighter and better connection, to give you years of trouble-free service. They are all made of high-strength alloys for extra strength to maintain their tightness through the years.

JASPER BLACKBURN CORPORATION
38 MADISON STREET • ST. LOUIS 6, MISSOURI
Phone CEntral 3007

BLACKBURN *Hi-Strength* CONNECTORS



⅝"—11 x 3
Oval Neck
Silicon Bronze
Connector Bolt



HARPER

EVERLASTING FASTENINGS

END CORROSION PROBLEMS

Costly electrical equipment . . . transformers—switches—connectors—insulators . . . must be guarded against corrosion's constant menace.

You protect this vital equipment—prolong its life—reduce maintenance costs with Harper Everlasting Fastenings that resist corrosion.

Connector bolts—carriage bolts—hanger bolts—lag bolts—machine bolts . . . nuts—machine screws—wood screws—washers—rivets—cotter pins . . . The H. M. Harper Company makes them all, in non-ferrous metals and all stainless steels, and Harper is the largest manufacturer in this field. Over 7,000 fastenings in stock—ready for prompt delivery.

Call the Harper Branch or Distributor in your area, or write for the Harper catalog.

THE H. M. HARPER COMPANY
8205 Lehigh Avenue
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BOLTS • NUTS • SCREWS
WASHERS • RIVETS • STUDS
SPECIALS of:
SILICON BRONZE • COPPER
ALUMINUM • BRASS
NAVAL • BRONZE • MONEL
ALL STAINLESS STEELS

HARPER
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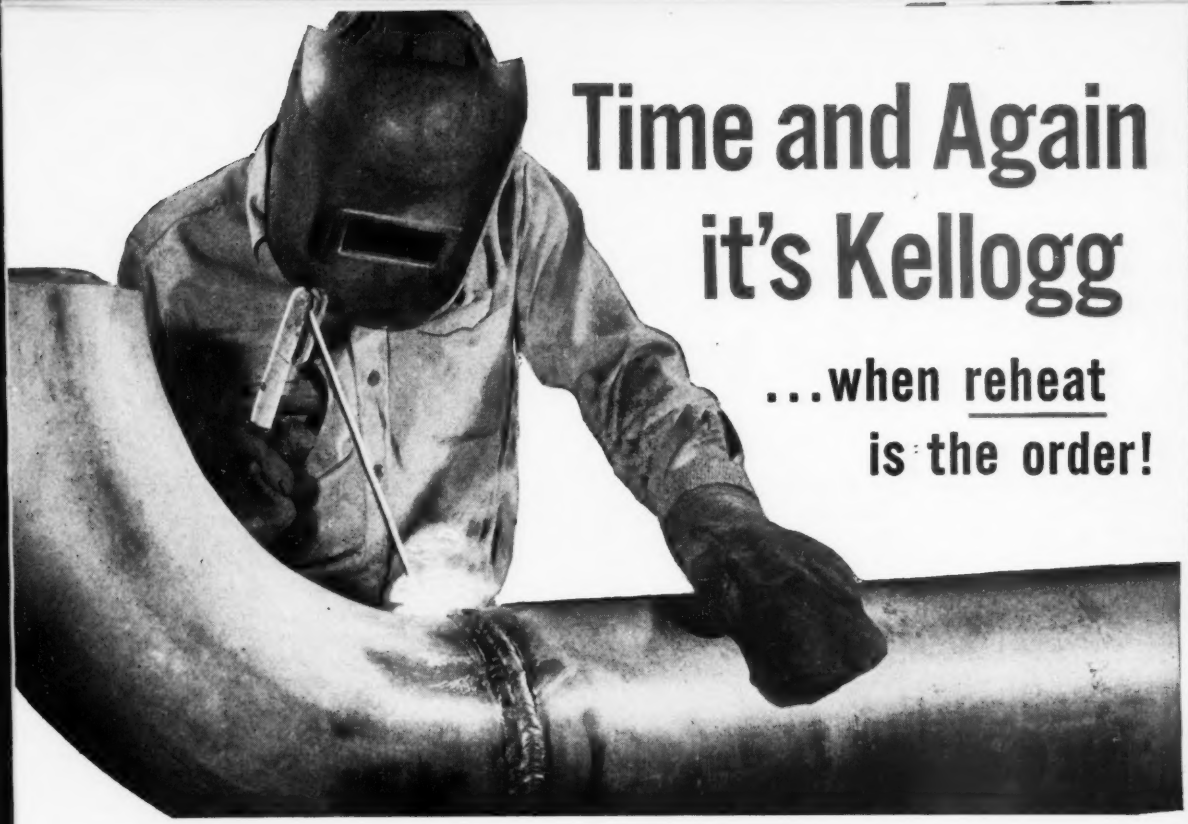
SPECIALISTS IN ALL
CORROSION-RESISTANT FASTENINGS



Time and Again it's Kellogg

...when reheat is the order!

WHY KELLOGG . . . particularly for reheat piping systems? There appear to be several factors responsible, all derived directly from the fundamentals of the reheat systems themselves.

Naturally, the *double* intake and exhaust turbine leads complicate these piping layouts . . . the higher temperatures employed increasing the need for accurate determination of stress and reaction values and the extra-careful positioning of restraints. Designers frequently have found Kellogg's unique model tester of considerable help in solving these problems. With it, they can pinpoint stress and reaction values and line deflections, change proposed layouts to meet their findings, and retest . . . *all in a matter of hours rather than days or even weeks.*

Then the elevated temperatures, which make these reheat systems economically attractive dictate the use of alloy steel piping. Here, utility company engineers well realize that experience and meticulous production methods are essential for fault-free installations. Kellogg's experience has two-fold interest to these purchasers.

First, Kellogg has specialized in high-temperature, high-pressure power piping for more than three decades, has installed the alloy main steam piping for more than 6¼ million KWS of output. During this period the company has in many cases led the way with research work to determine the most desirable steel analyses, bending and welding methods, heat treatment techniques and quality controls.

Second, in the field of alloy fabrication, Kellogg fabricated the first stainless power installation, establishing the heating cycles for welding and post-welding treatment . . . set the specs for the welding electrodes. Add to this innumerable other alloy piping installations in all branches of industry, including a current job for the AEC which alone involves the installation of over 25,000 tons of piping.

The total of this specific experience, when combined with active, continuous research and development work pointed toward further improvements in materials and fabricating techniques . . . are the basic reasons why **"Reheat power piping by Kellogg"** is so often the specification . . . *36 times within the current power expansion period.*

OTHER FABRICATED PRODUCTS Including: Pressure Vessels . . . Vacuum Vessels . . . Fractionating Columns . . . Drums and Shells . . . Heat Exchanger . . . Process Piping . . . Bends and Headers . . . Forged and Welded Fittings . . . Concrete and Radial Brick Chimneys

These leading companies are among the many major producers of power who use

M. W. KELLOGG POWER PIPING . . .

- Consolidated Edison Co. of N. Y.
- Consumers Power Co.
- Detroit Edison Co.
- Dow Chemical Co.
- Elektricitetsselskabet Isefjordvaerket (Denmark)
- Ford Motor Co. of Canada Ltd. (Canada)
- General Electric Co.
- Hartford Electric Co.
- Houilleres Du Lorraine (France)

For further information, details of methods, etc. contact

FABRICATED PRODUCTS DIVISION

THE M. W. KELLOGG COMPANY

225 Broadway, N. Y. 7, N. Y.

or offices in Jersey City, Buffalo, Los Angeles

Tulsa, Houston, Toronto, London and Paris

KELLOGG — Subsidiary of PULLMAN INCORPORATED

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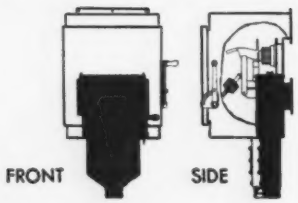
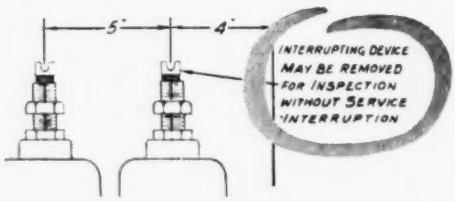
POWER PIPING

3 good reasons why 3E AIR INTERRUPTER ISOLATORS are best for transformer use

In standard procedure normal load of transformer is interrupted by an interlocked secondary breaker leaving only magnetizing current in primary circuit to be broken. The Interrupter ISOLATOR is ideal for such applications.





1 SAVES SPACE

The Air Interrupter ISOLATOR is neat and compact, occupying only one-fourth of the space required for other types of interrupting equipment.

Diagram shows space saved by superimposing a three pole, single throw, 400 ampere, 5000 volt Air Interrupter Cable ISOLATOR, with throat for transformer mounting, over equivalent air interrupter switch. Ratio is approximately 4 to 1 in favor of ISOLATOR.

2 SIMPLE TO INSTALL and MAINTAIN

Air Interrupter ISOLATORS are lighter; consequently they can be handled more easily by construction crews.

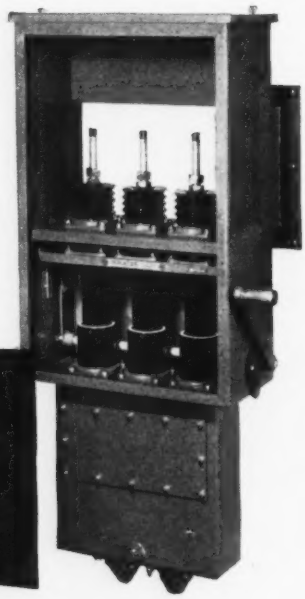
The interrupter units can be removed for inspection by means of a hot stick without clearing the circuit.

For complete data ask for new Bulletin 138.

3 ECONOMY . . . 3E PERFORMANCE EQUALS COSTLIER EQUIPMENT

The Air Interrupter ISOLATOR will provide safe interruption at much less cost than interrupter switches or other approved devices. These ISOLATORS are built for loads up to 15,000 volts . . . and their cost is surprisingly low.

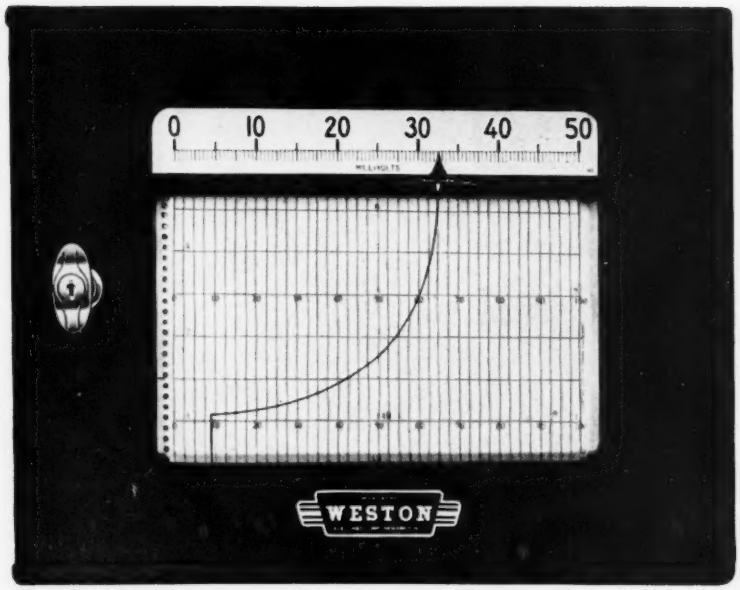
CABLE ISOLATOR
3 pole, single throw
400 Ampere, 15,000 volts.



THREE E

ELECTRICAL ENGINEERS EQUIPMENT CO.
MELROSE PARK, ILLINOIS

THE Simplicity Features INSTRUMENT MEN PREFER



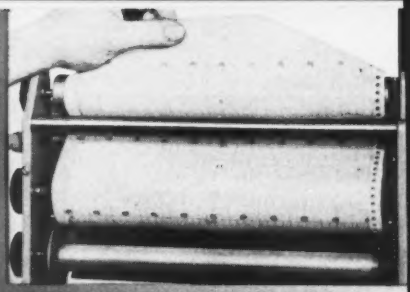
Simplified WESTON Recording Potentiometer

Here is the recorder that has been widely acclaimed by instrument men because its new design concept has contributed new simplicity and new economies in instrument operation and maintenance. More compact, too; and its rugged construction gives it new resistance to vibration and shock, assuring sustained high accuracy over longer periods. Can be used to measure and record temperature, d-c current, d-c voltage, resistance, a-c voltage, a-c current, speed, speed ratio, power, frequency, hydrogen ion (pH), light intensity or any other quantity that can be converted into electrical values. The whole story is available in booklet form. Write for your copy today. WESTON Electrical Instrument Corporation, 614 Frelinghuysen Avenue, Newark 5, New Jersey.
Representatives in all principal cities. In Canada . . . Powerlite Devices, Ltd., Montreal, Toronto.

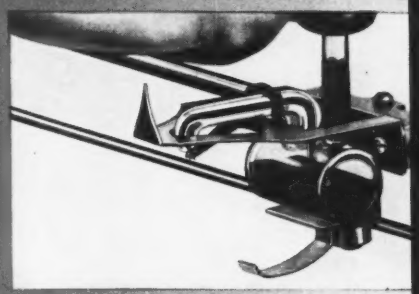
WESTON

WESTON *Instruments*

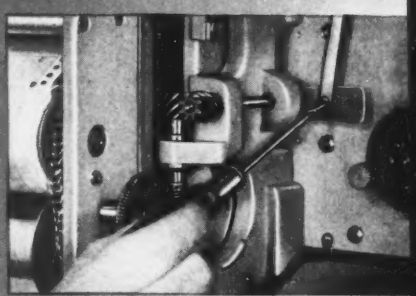
INDICATE — RECORD — CONTROL



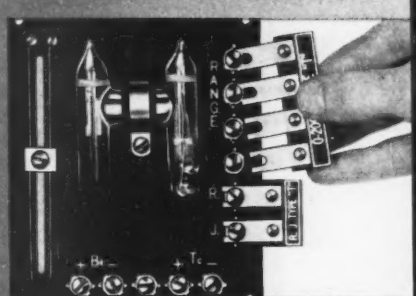
TO CHANGE CHARTS, you simply swing chart frame open a full 180°, insert chart and swing it over timing drum and across front of frame and fasten. No loose pieces to handle!



TO REFILL PEN, simply open chart frame completely exposing pen for quick, easy filling. Recorder continues operation and charts remain in time sequence during filling.

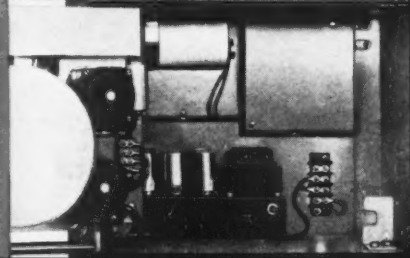


TO CHANGE CHART SPEEDS, a simple screwdriver adjustment gives you a choice of 5 different speeds. These speeds are doubled or quadrupled by changing one worm and gear assembly.



TO CHANGE RANGES, you simply substitute the desired range standard. The reference junction compensation is changed in like manner. No soldered connections to break!

TO REMOVE THE AMPLIFIER, you simply take out two screws and pull two plugs. With no soldered connections servicing is quick and simple. ▼



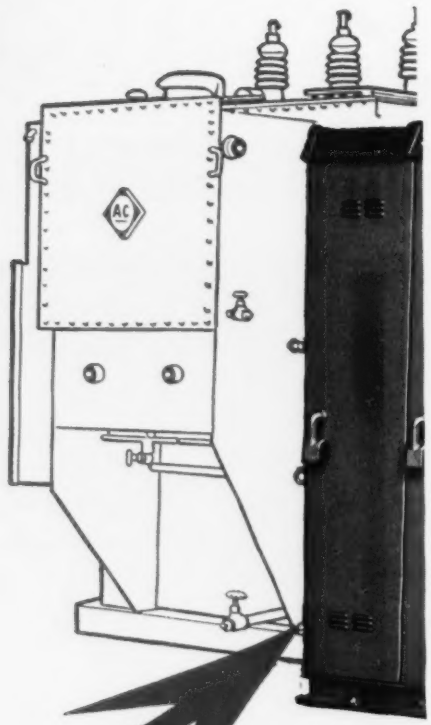
ALLIS-CHALMERS

MULTI-CIRCUIT

Unit Substations

Are Easy to Double-End

Now You Can Install A-C Unit Substations That Are Planned for Easy Future Double-Ending Without Service Interruption!



WHEN LOAD GROWTH demands additional power, or when you want the added reliability of two transformers, the Allis-Chalmers Unit Substations you install today will be easy to double-end.

Your line crew will find all mechanical and electrical connections easy to make . . . the transformer throat and switchgear bus easy to align. That's because sufficient mechanical flexibility is built into the throat to permit realistic tolerances in concrete base construction.

Design Aids Quick Field Assembly

Pre-drilled bus extensions are accessible and flexible enough to be consistent with throat construction. There are no compound-filled joints requiring melting, chipping, cracking, or scraping. Just apply no-corona tape and insulating tape to finish the job.

Double-ending is easy also in terms of system operation. When planned from the initial installation, double-ending can be accomplished with no interruption in power service to your customers. Even on substations not planned initially for double-ending, the job can be done with minimum outage.

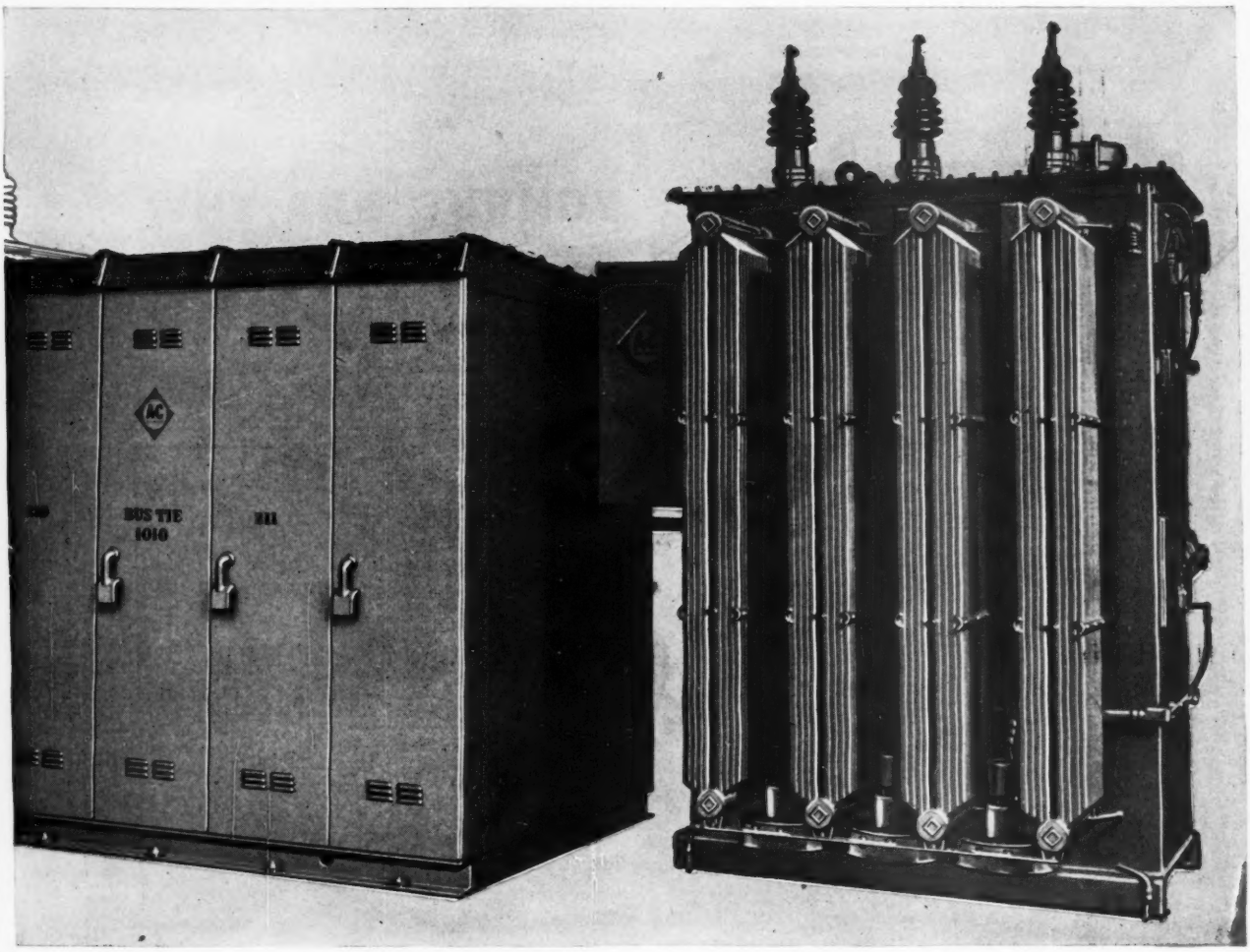
Because Allis-Chalmers Unit Substations are designed to grow with your system, they are a convenient answer to the growing distribution problem . . . to the ever-increasing demand for power and yet more power. They are simple to specify, neat and modern in appearance, and easy to expand.

You Save These Five Ways:

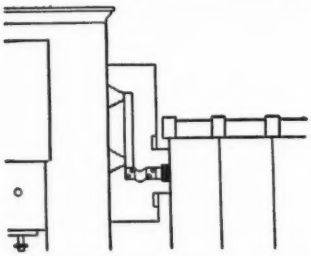
(1) Original equipment cost is low; (2) compact construction reduces space requirements and real estate costs; (3) pre-wired unit design speeds installation; (4) maintenance is quick and economical because of improved accessibility; and (5) you purchase only the equipment you need *now*, deferring additional expenses until load growth demands the expenditure.

For the full story on what Allis-Chalmers Unit Substations can mean in your distribution system, call your nearby A-C representative, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3729

ALLIS-

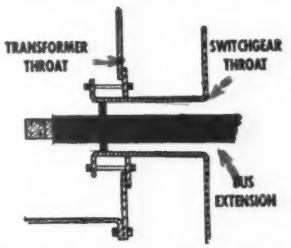


Here's Why It's Easy to Double-End MCS's



1 THE THROAT OPENINGS of all substation transformers, regardless of rating, are the same height as switchgear throat opening. This standardized throat location permits easy addition of a new transformer to the switchgear end of an installed Allis-Chalmers Unit Substation . . . simplifies and speeds field assembly.

2 FEEDER UNITS are jig built so that each feeder cubicle is exactly like every other one. Bus extension openings, control wiring openings . . . even small screw holes . . . are pre-cut in jigs. This careful, uniform construction makes addition of a main breaker easy . . . assures easy alignment of the new transformer.



3 MECHANICAL AND ELECTRICAL connections are easy to make. Bus connectors and transformer throat are flexible enough to compensate for minor irregularities in concrete surfaces. Silver-plated, pre-drilled bus extensions are easy to bolt together. No-corona tape and insulating tape finish the joint.

CHALMERS

A-C ALLIS-CHALMERS

Q. *Say, what's that new Street Light I've been seeing everywhere lately?*

A. IT'S THE WHEELER CRESCENT REFLECTOR

Q. *Why is it made in that interesting shape?*

A. **Careful research and engineering dictated this shape. It provides the best possible light distribution from a small, inexpensive open reflector.**

Q. *Who makes it?*

A. **The Wheeler Reflector Co., of Boston, Mass., specializing in skillfully engineered lighting equipment of the highest quality since 1881.**

Q. *What's so good about it?*

A. **It's the *only* inexpensive open reflector yet devised that satisfies *all* requirements — including vastly improved optical control, lasting durability and modern eye appeal. It's the only reflector that has come through actual trials by hundreds of utilities with uniformly favorable public reaction. No other attempt at improving the small, open street light reflector has ever approached this record of achievement.**

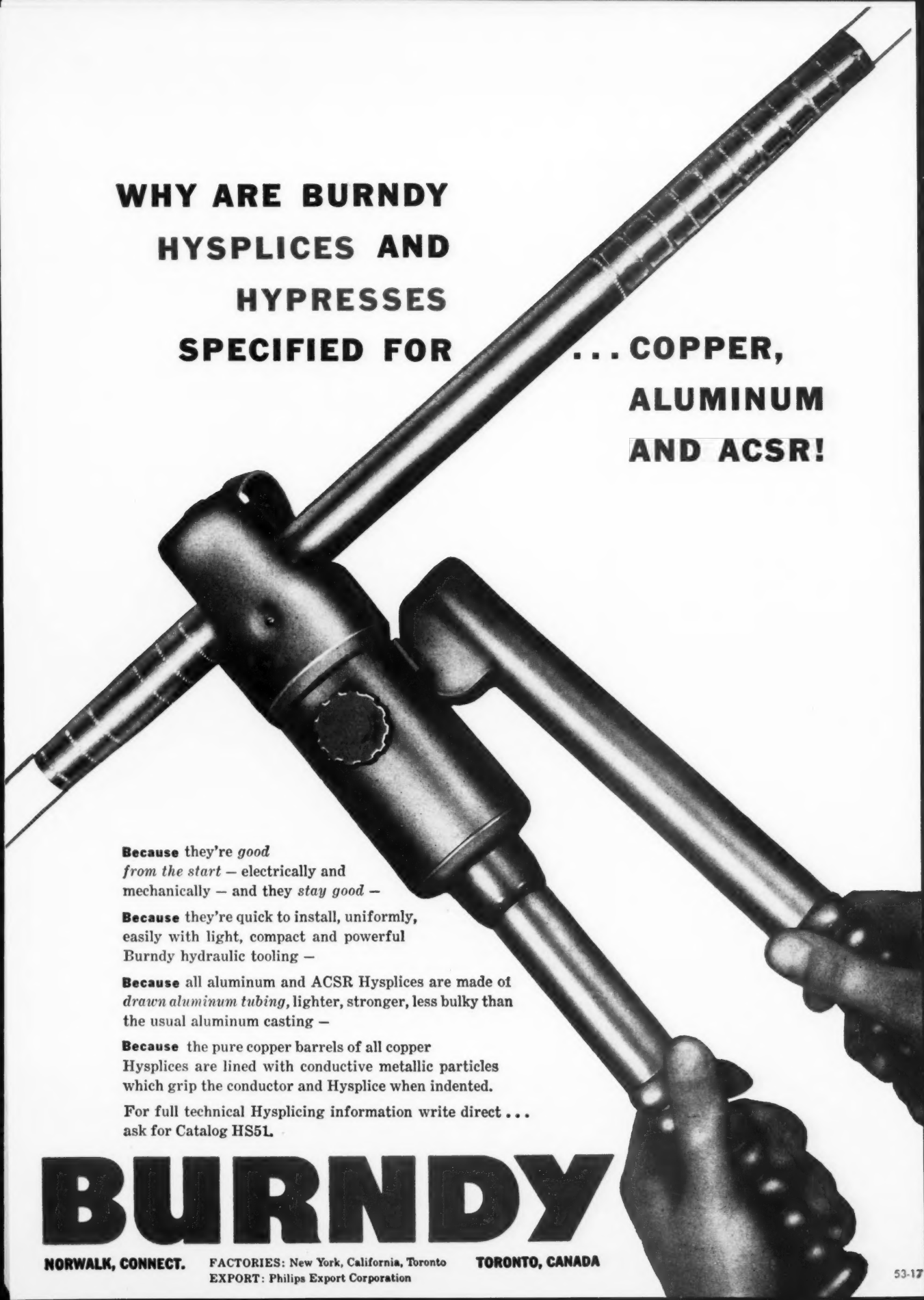
Q. *How soon can we get these new lights?*

A. **Available now on order. Write for facts and figures concerning your own specific requirements. Nation-wide acceptance of the Wheeler Crescent Reflector is being extended at a rapidly increasing rate as more utilities, municipal lighting plants and lighting engineers discover the unique superiority of this revolutionary, Wheeler-designed street light.**

Wheeler REPRESENTS THE MOST ADVANCED ENGINEERING IN STREET LIGHTING

WHEELER REFLECTOR CO. 275 CONGRESS ST. BOSTON 10, MASS.

WHY ARE BURNDY HYSPLICES AND HYPRESSES SPECIFIED FOR ... COPPER, ALUMINUM AND ACSR!



Because they're *good from the start* – electrically and mechanically – and they *stay good* –

Because they're quick to install, uniformly, easily with light, compact and powerful Burndy hydraulic tooling –

Because all aluminum and ACSR Hysplices are made of *drawn aluminum tubing*, lighter, stronger, less bulky than the usual aluminum casting –

Because the pure copper barrels of all copper Hysplices are lined with conductive metallic particles which grip the conductor and Hysplice when indented.

For full technical Hysplicing information write direct ... ask for Catalog HS51.

BURNDY

NORWALK, CONNECT. FACTORIES: New York, California, Toronto **TORONTO, CANADA**
EXPORT: Philips Export Corporation

53-17

NEW UTILITY STATIONS C-E EQUIPPED

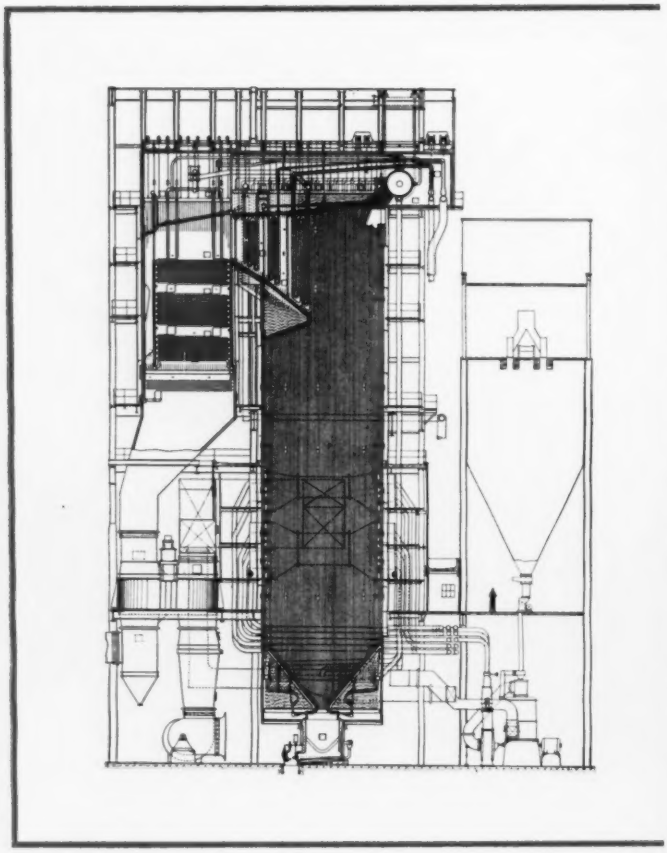
Includes stations placed in operation since the war (in white) and those under construction or being engineered.

TIDD • JENNISON
CECIL LYNCH • HAVANA
MEREDOSIA • PERMIAN BASIN
O. H. HUTCHINGS • REX BROWN
HICKLING • B. C. COBB
RUSSELL • SEWAREN
POSSUM POINT • CUTLER
PORT JEFFERSON • WHITE RIVER
POTOMAC RIVER • GADSDEN
W. SPRINGFIELD • WOOD RIVER
DAN RIVER • LAKE CATHERINE
HARRY NEWMAN • JIM HILL
HUTCHISON • YATES
DUNKIRK • TITUS • LEE
CONTRA COSTA • HAWTHORN
NINEMILE POINT • EDGE MOOR
PALATKA • JOHNSONVILLE
DANSKAMMER • BECKJORD
HIGHGROVE • PLANT X
BLACK DOG • ALBANY

JOPPA

MERAMEC
PORTSMOUTH
ETIWANDA
LAKE CREEK
HENNEPIN
URQUHART
EASTLAKE
OAK CREEK
AURORA
KINGSTON
BARRY
SUWANNEE RIVER
NELSON
SAGUARO
SANDOW
MULLERGREN
WILMINGTON
MILLIKEN
JOHN SEVIER
VERMILION
GALLATIN

NEW



The cross-sectional view above shows one of the four C-E Units which will comprise the new Joppa Steam Station of Electric Energy, Inc. These units are of the radiant-reheat type with the reheater section located between the primary and secondary superheater surfaces. Economizer surface is located below the rear superheater section and regenerative air heaters follow the economizer. Pulverized coal is employed using bowl mills and tilting, tangential burners. Provision is made to use oil and natural gas as alternate fuels. Each unit serves a 162,500 kw turbine-generator operating at a throttle pressure of 1800 psi with a primary steam temperature of 1050 F, reheated to 1000 F.

COMBUSTION

Joppa Steam Station goes into service

More vitally-needed power became available to the new atomic production plant at Paducah, Kentucky with the recent starting up of the first unit of the new Joppa Steam Station at Joppa, Illinois.

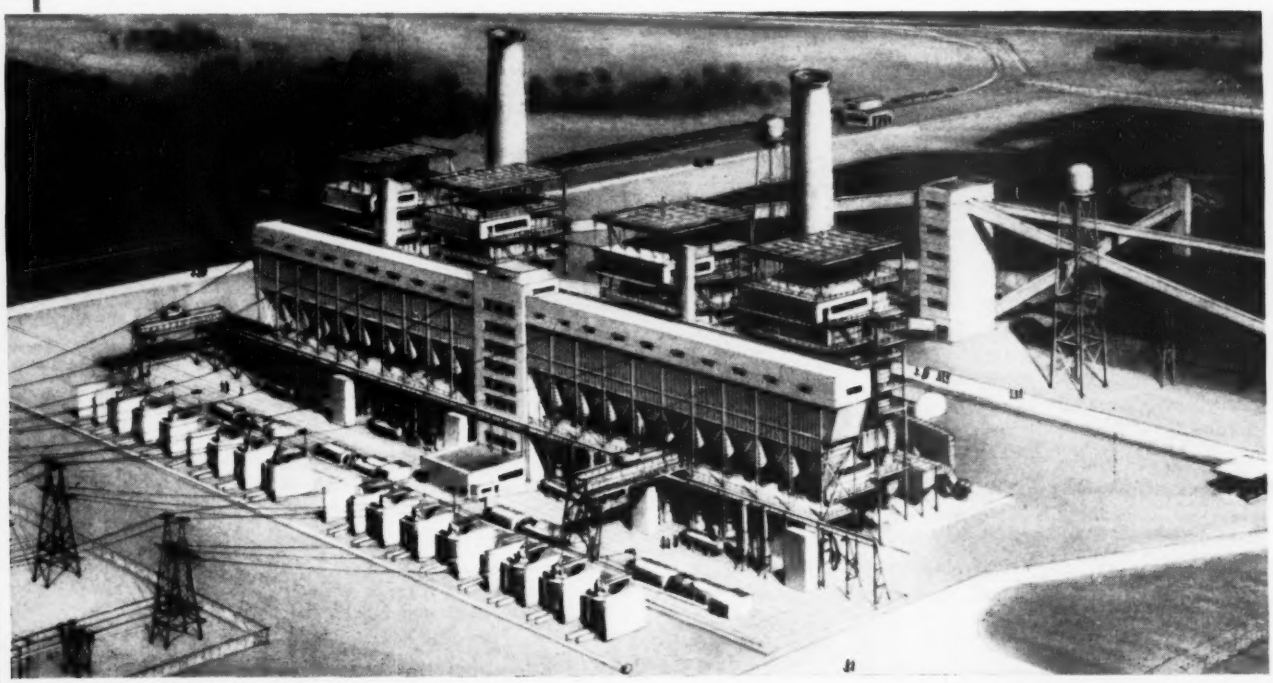
This huge, modern station is being built by Ebasco Services, Inc., Consulting Engineers, for Electric Energy, Inc., a company formed by five major electric utility companies* to operate the station.

Joppa Station marks another milestone in the history of power generation for it will be the first station to have an initial capacity as high as 650,000 kw.

Each of its four 162,500-kw turbine generators will be served by a C-E Steam Generating Unit. A cross sectional elevation and brief description of these boilers, which rank among the largest ever built, appear on the opposite page.

• • •

**Electric Energy, Inc. is comprised of these utility companies:*
Central Illinois Public Service Company
Illinois Power Company
Kentucky Utilities Company
Middle South Utilities, Inc.
Union Electric Company of Missouri



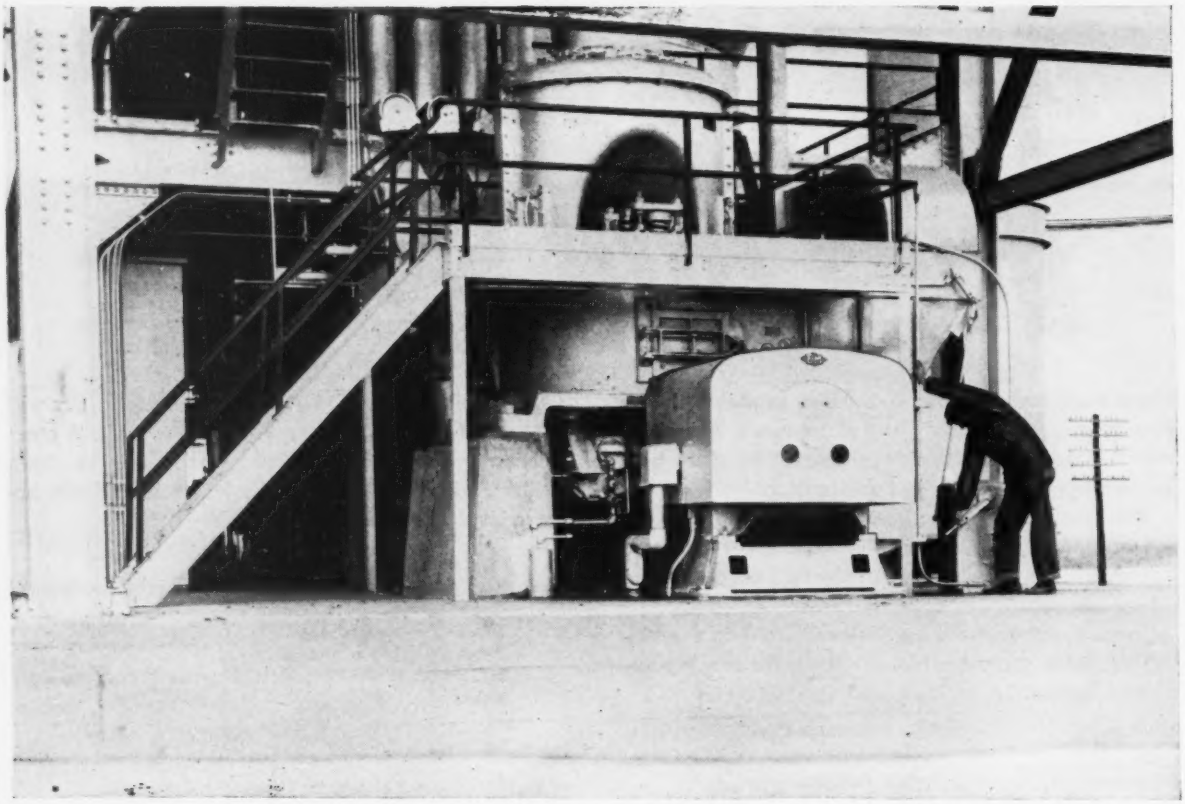
B-661

ENGINEERING Inc.

C-E

Combustion Engineering Building • 200 Madison Avenue, New York 16, N. Y.

ALL TYPES OF BOILERS, FURNACES, PULVERIZED FUEL SYSTEMS AND STOKERS; ALSO SUPERHEATERS, ECONOMIZERS AND AIR HEATERS



E-M Weather-Protected Outdoor Induction Motors are ready for steady service under all kinds of weather conditions. Shown above is a 250 hp, 1200 rpm, 2300 volt E-M Squirrel-Cage Induction Motor driving a coal pulverizer at the Lawrence station of the Kansas Power and Light Company. Consider this type of special E-M protective enclosure for your next outdoor drive installation.

Putting them OUTDOORS or *either way, E-Mgineered heavy-duty motors give*

Indoors or out, E-M's new large squirrel-cage induction motors will give you something "extra" in appearance, durability, and reliability on your large high speed drives.

From the smoothly contoured, modern design protective enclosures to the long life, smooth running bearings, E-M Heavy-Duty Induction Motors incorporate many special design features. These features provide maximum protection to insure economical, dependable motor operation. And as motors get bigger, ruggedness and reliability are doubly important.

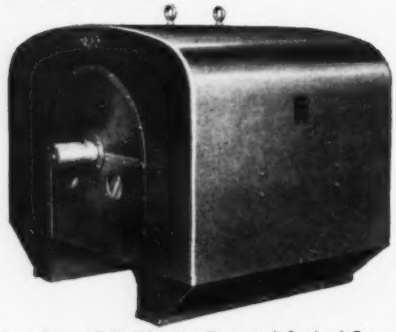
Here are typical features that "E-Mgineered" Heavy-Duty Induction Motor designs give you:

1. MODERN PROTECTIVE ENCLOSURES... Protective enclosures are designed to provide more than adequate protection to coils and bearings . . . offering at the same time a neat, trim appearance.

2. STURDY FRAME CONSTRUCTION . . . Stator frames are of strong, rigid, reinforced steel plate construction . . . fabricated with heavy, continuous welds, treated to relieve stresses.

3. LOW LOSS STATOR CORE . . . Core laminations are of thin-gauge, low loss, non-aging silicon steel, precision punched to insure true slots. Laminations are individually enameled to minimize stray load losses.

4. LONG LIFE STATOR COILS . . . Stator coils, preformed to fit core slots accurately, have insulation engineered for the application. Leads are carefully bound and sealed. Coil ends are tightly lashed to each other and to heavy bracing rings to prevent distortion on full-voltage starting.



Exterior of new E-M Weather-Protected Squirrel-Cage Induction Motor, designed to provide dependable outdoor service under the most rigorous weather conditions.

The eye-catching motor shown at left is a recent example of E-M's advanced design and construction in the field of 2-pole induction motors. Notice especially how the streamlined enclosure provides adequate protection while giving the motor a sleek, neat look. All details of electrical and mechanical construction are planned with the same care to give the user the utmost in motor performance and dependability.

Bracket-Bearing E-M Two-Pole Squirrel-Cage Induction Motor uses contoured frame and oil pump enclosure for trim appearance. Forced ventilation system with intake and discharge through base.

1300-TPA-2134A

INDOORS?

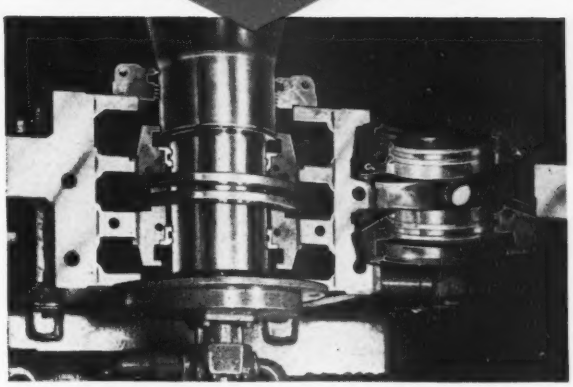
you maximum protection

5. RUGGED ROTOR CONSTRUCTION . . . Rotors have large, strong, stiff shafts and complete, non-segmented circle laminations tightly anchored to shaft or rotor spider. Rotors are precision balanced in a "dynetric" electronic balancer to limits substantially better than commercial standards.

6. LONG LIFE, SMOOTH RUNNING BEARINGS . . . E-M sleeve-type bearings with precision bored babbitt liners, journals with modern one-to-one ratio of diameter to length, and cool oil supply insure reliable, trouble-free operation. Kolene-processed bearing liners are used on large machines and those machines having high journal peripheral speed. Anti-friction bearings are available on some ratings.

For specific details that will pertain to your own requirements, consult your nearest E-M sales engineer. And write the factory for E-M Synchronizer No. 34 and Foto-Facts No. 21, describing what's new and important in the design of large induction motors.

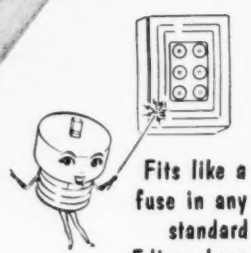
ELECTRIC MACHINERY MFG. CO.
MINNEAPOLIS 13, MINNESOTA



Section of sleeve-type bearing, showing journal, oil rings, linings, and "aerodynamic" pressure seal to eliminate oil vapor leakage.

- **NEW LISTING!**
- **NEW LABEL!**
- **NEW RANGE OF APPLICATION!**

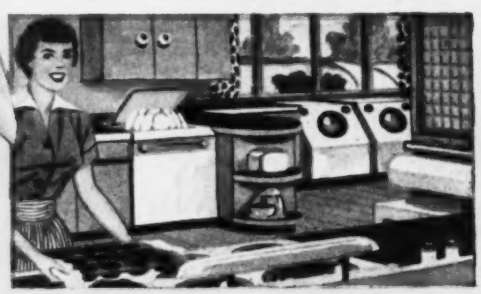
MINI



Fits like a fuse in any standard Edison base fuseholder!

© 1952—MECHANICAL PRODUCTS, INC.

FOR RESIDENTIAL,
Produced in Three Ratings—



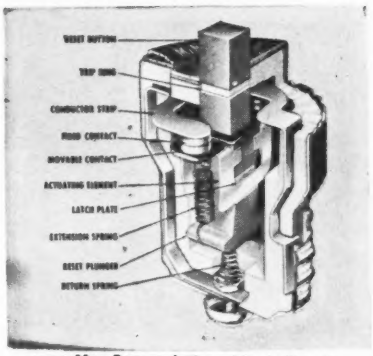
"No need to fuss with blown out fuses!" Millions of homes can now afford this new permanent circuit protection!

-BREAKER®

Now Listed and Labeled as a "Circuit Protector" by Underwriters' Laboratories, Inc.!

IMAGINE a circuit protective device so basic in concept, yet so revolutionary in design and operation that an entirely new product classification had to be established in order to permit its proper listing by Underwriters' Laboratories, Inc. Well, that's MINI-BREAKER! Because, though it fits like a fuse in any standard Edison base fuseholder, new MINI-BREAKER actually provides *permanent protection* against overloads and short circuits! Nor is it just another variation of conventional circuit breaker design. Because, while it's capable of meeting the most rigid test and operating requirements, MINI-BREAKER has no switch mechanism, no intermediate position.

That's why, after careful analysis, a new classification had to be created. That's why, today, MINI-BREAKER is the only device of its kind listed as a "Circuit Protector" suitable for both branch and main circuits . . . the only device of its kind now bearing the label of Underwriters' Laboratories, Inc.



INSIDE MINI-BREAKER! 25 precision built parts carefully assembled and permanently enclosed within a durable, protective insulating case. Only two movable sub-assemblies . . . and these operate only when required to break and make the circuit.

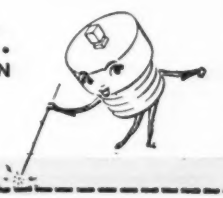
Easy to Install, Simple to Reset!

No wonder MINI-BREAKER takes a bow as "the most economically installed permanent circuit protective device on the market today!" Anyone can install MINI-BREAKER in a matter of seconds simply by screwing it into an Edison base fuseholder. No additional equipment required, no special wiring or rewiring necessary! *Anyone* can reset the device to restore service.

MINI-BREAKER is a rugged, precision built circuit protector. Dependable in operation, too. It safely interrupts all dangerous overloads and short circuits . . . tripping instantly on "shorts", but with a built-in time lag for handling temporary starting loads and line surges. Whenever an interruption occurs, however, service can quickly be restored . . . normally within 10 seconds . . . merely by pressing in and releasing the reset button. Simple! Yet, in spite of its quick recovery, MINI-BREAKER is 100% trip-free. That is, it positively will not maintain a circuit that has not been cleared of the condition that caused the interruption!

WANT MORE INFORMATION ON MINI-BREAKER? Regardless of what your interests may be, we'd like to tell you more about the amazing new MINI-BREAKER. A request on your company letterhead . . . or the coupon below . . . will bring you the complete story by return mail.

MECHANICAL PRODUCTS, INC.
1824 RIVER STREET • P. O. BOX 116 • JACKSON, MICHIGAN



COMMERCIAL, AND INDUSTRIAL USE!

15, 20, and 30 Ampere—for A. C. Service to 125 Volt Max.

MINI-BREAKER'S a "natural" for commercial installations. Safe, convenient, practical, economical.

In industry, MINI-BREAKER meets maintenance needs, plus new product design requirements.

MECHANICAL PRODUCTS, INC., Dept. 101
1824 River St. • P. O. Box 116 • Jackson; Michigan

Gentlemen: Please send me the complete MINI-BREAKER story at once.

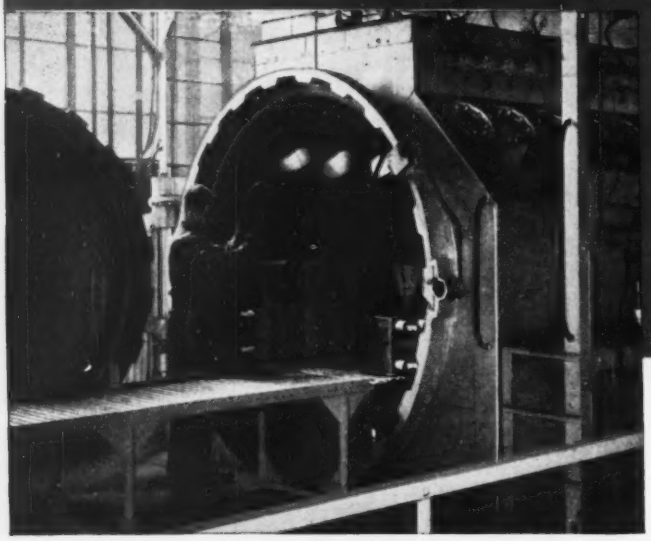
NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

Get all 4 advantages



ALLIS-CHALMERS

INSTRUMENT TRANSFORMERS

1. *Insulation completely protected against air and moisture*
2. *No insulating liquids to maintain*
3. *No leakage — simplified storage and handling*
4. *High dielectric strength*

VACUUM-PRESSURE PROCESS ADDS YEARS TO INSTRUMENT TRANSFORMER LIFE. In the chamber shown above, Allis-Chalmers vacuum-pressure compound-filling process makes the core and coil assembly and its insulation a solid, compact unit within its case. As a result, insulation is completely protected against outside air and moisture. High dielectric strength is assured. And transformer maintenance is greatly reduced.

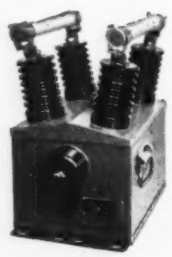
HERE'S HOW IT'S DONE

Two steps do the job. First, a combination of high vacuum and heat drive moisture from the core and coil assembly. Then, while the vacuum is maintained, the case is filled with hot compound which is chemically stable and free of absorbed gases and impurities. This draws hot compound into the innermost parts of the assembly, preventing local ionization and extending normal insulation life.

ELIMINATES PERIODIC TESTING

Since compound-filling eliminates insulating liquids, periodic inspections can be reduced. There is no need for filtering or testing liquids. Storage and handling are simplified because there is nothing to leak out. It is easy to see why you save money and trouble. Why not call your nearby A-C district office today and get more information. Or write Allis-Chalmers, Milwaukee 1, Wisconsin.

Outdoor current transformers, Type KO, rated up to 15 kv and 1800 amp.



Indoor potential transformers, Type PD, rated up to 14,400 volts, 200 va, fused or unfused.

Outdoor potential transformers, Type PWD, rated up to 15 kv, 200 va.

A-3978

ALLIS-CHALMERS

BIDDLE
Instrument News

- ELECTRICAL TESTING INSTRUMENTS
- SPEED MEASURING INSTRUMENTS
- LABORATORY & SCIENTIFIC EQUIPMENT

JAMES G. BIDDLE CO., 1316 ARCH ST., PHILADELPHIA 7, PA.

BRIDGE-MEG®

SAVES THE COST OF TWO INSTRUMENTS

SAVES TESTING TIME

The Bridge-Meg is really two instruments in one. It combines a Wheatstone Bridge for measuring conductor resistance of coils, resistors and circuits, and a Megger direct reading ohmmeter for measuring electrical insulation resistance. A Varley Loop feature for locating faults on wires may also be included. The combined, compact instrument weighs about 15 lbs.

Practically everything you need is provided in the Bridge-Meg for electrical resistance measurements from a fraction of an ohm up to 1000 megohms. A multi-position rotary switch changes internal connections between insulation resistance tests, Wheatstone Bridge and the Varley Loop connection. Scale reads directly in ohms and megohms.

The Bridge-Meg requires no batteries or outside source of current. Test current is supplied by a hand-cranked generator. Its constant-voltage mechanism eliminates the "human element" in the speed of turning the crank.

Available complete with carrying case and test record cards in a standard selection of 5 ohmmeter scales.

Write for 12-page **Bulletin 21-60-W.**

MEASURES ELECTRICAL RESISTANCE AS LOW AS 10 MICROHMS

Megger® Portable Low Resistance Ohmmeters

Self contained battery-operated and rectifier-operated types of Megger Low Resistance Ohmmeters have just been developed. They are designed for hard routine and emergency service in measuring contact resistance, such as in circuit breakers, relays, switches, bonds, connections and joints, commutator bar-to-bar tests and the like.

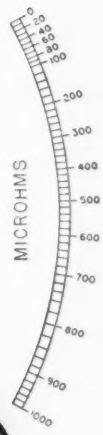
These portable instruments (weight 19 lbs.), are designed for low resistance measurements in the shop and in the field. They are of moderate cost and are accurate to within 1.5% of full scale deflection.

Model 1B operates from two 4 FH dry cells mounted inside the case.

Model 1R operates from a rectifier, built inside the instrument case, for connecting to 115 volts, 50-60 cycles.

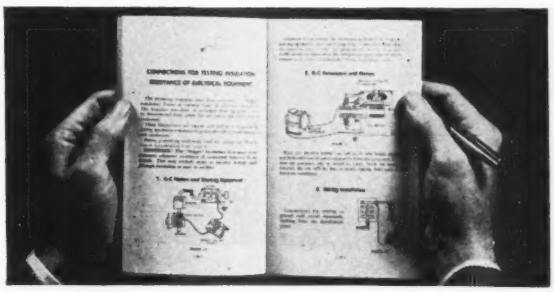
These new instruments operate on the same crossed-coil ohmmeter principle as the Ducter Low-Resistance Ohmmeter, with pointer indications of resistance and no necessity for balancing or voltage adjustment. Anyone can operate this equipment — no special training or experience is required.

Write for **Bulletin 24-46-W.**



MEGGER® MANUAL

tells you how to test ELECTRICAL INSULATION



This 94 page manual is in demand by educators as well as practical electrical men. It covers subjects of necessity to anyone who is responsible for electrical equipment.

"Why Test Insulation Resistance?"
"Preparation of Apparatus for Test"
"Tests When Drying Out Wet Apparatus"
"Temperature Correction"
"Methods and Interpretation"

These are but a few of the 14 chapters that are built around the subject of testing electrical insulation resistance . . . and, of course, effective use of the Megger® Electrical Insulation Resistance Tester sold in the U. S. only by the James G. Biddle Co. Supply is limited. Please write on your company letterhead for **INSTRUCTION MANUAL 21-J-W.**

JAMES G. BIDDLE CO. B825
1316 Arch St., Philadelphia 7, Pa.

Please mail me

☐ Bulletin 21-60-W ☐ Bulletin 24-46-W ☐ Bulletin 21-J-W

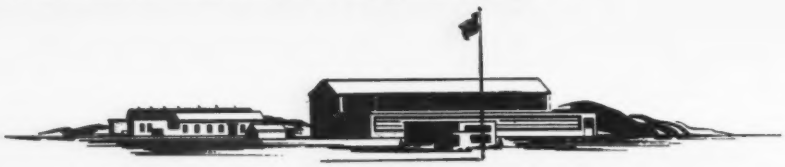
*Name*_____

*Job*_____

*Company*_____

*Address*_____

From B&W Research & Engineering . . .



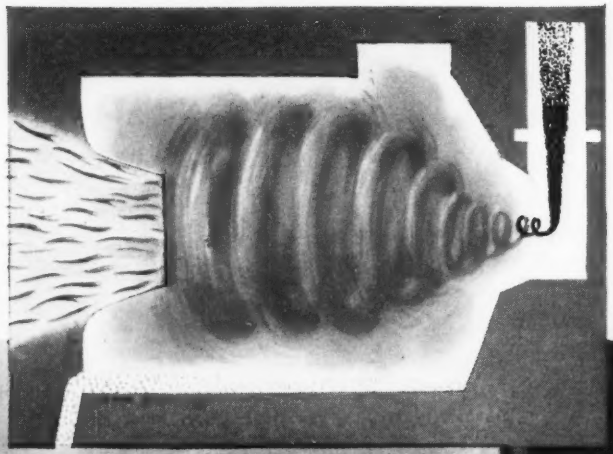
important advances in firing

Two important advances in firing—the Cyclone Furnace and Pressure Firing—used singly or in combination, are bringing major savings to central station and industrial boiler users. The reception and wide acceptance given both of these B&W developments result from proved efficiency and economy . . . amply demonstrated in the chart below.

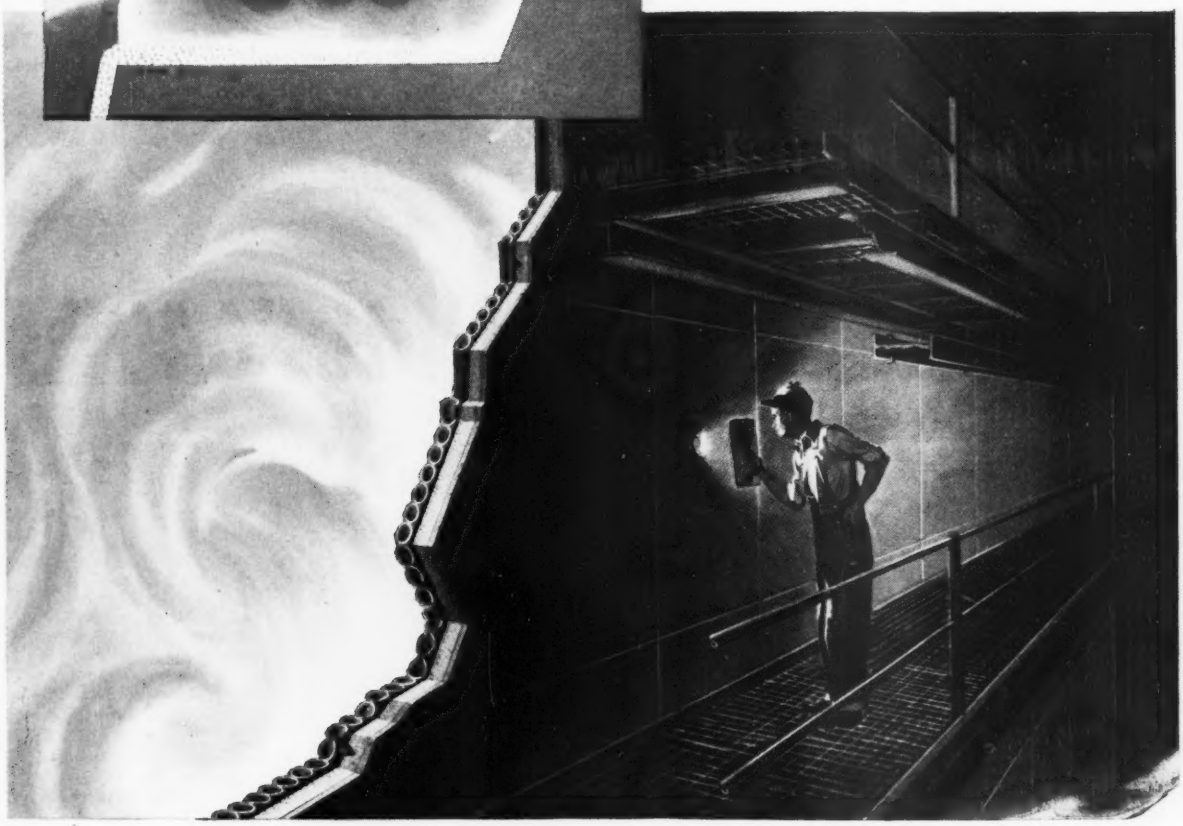
The chart lists many possible ways in which the Cyclone Furnace and Pressure Firing contribute to better operation—often just one advantage means important economy. The revolutionary Cyclone Furnace and B&W's long-range experience with Pressure Firing are well worth serious consideration in your evaluation.

We will be pleased to discuss these and other practical developments of B&W Research and Engineering as they relate to your power generation program and facilities. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, N. Y.

	EFFICIENCY	MAINTENANCE	AVAILABILITY	AUXILIARY POWER
CYCLONE FURNACE	• Efficient use of low-grade coals. • Extremely low carbon loss. • Low excess air.	• Practically no ID fan erosion. • Eliminates pulverizer maintenance. • Low maintenance on burner and coal preparation equipment. • Reduces cost of labor for ash and dust handling.	• Reduces slagging and cleaning of convection surfaces.	• Eliminates pulverizers. • Less soot blowing required.
PRESSURE FIRING	• Less stack loss . . . no air infiltration.	• Fewer controls to maintain. • No ID fan maintenance.	• Simplifies fan control.	• Less total fan power due to lower volume, weight, and draft loss handled by FD fan.



CYCLONE FURNACE

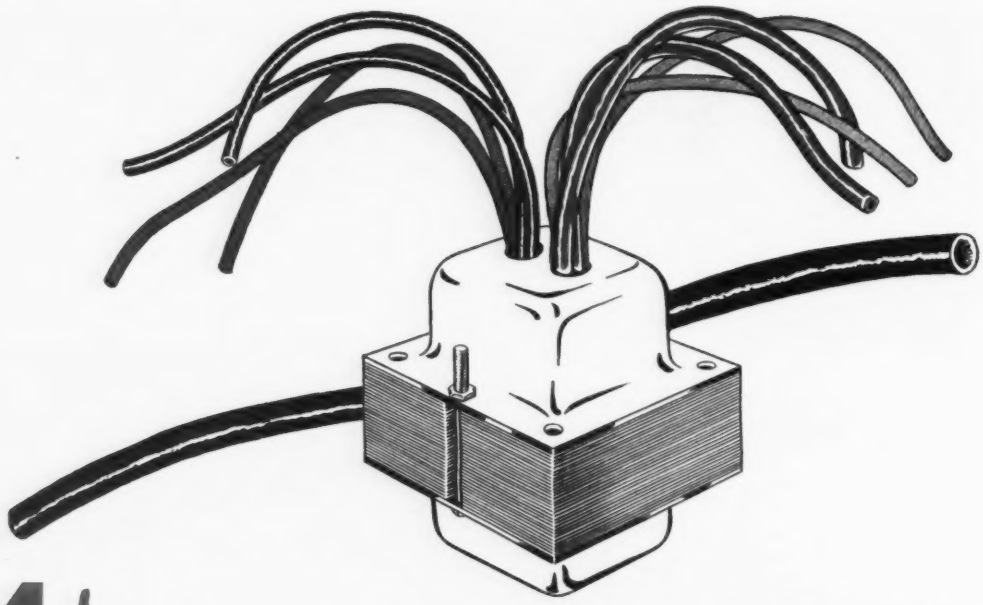


PRESSURE FIRING

INITIAL COST	ACCEPTANCE
• Lower building and foundation costs. • Greatly reduced fly ash emission requires less dust handling equipment . . . smaller precipitators • Eliminates electrical connections and controls for PC motors • Smaller soot blower compressor.	B&W's revolutionary method of firing is being used for boilers having steam capacities as high as 1,200,000 lb per hr., pressures to 2250 psi, and temperatures to 1050 F. Burning coal, oil, and gas. Total generating capacity of all Cyclone Furnace Boilers in service and on order is over 2,000,000 KW. Accumulated service-time on all units is nearly a half century.
• Simplified design lowers duct and stack costs • ID fan can often be eliminated.	Broad acceptance of B&W's pressurized-furnace design is shown by the units in service and on order—by 27 electric utilities and some industrial plants—to serve a total generating capacity exceeding 8,500,000 KW. They include Radiant, Open Pass, Integral-Furnace and Stirling Boilers with individual steam capacities ranging between 200,000 and 1,370,000 lb per hr., design pressures to 2700 psi, and temperatures to 1100 F.

BABCOCK & WILCOX

G-596



4¢ *lengths* of BH "649" cut assembly time

Standard Transformer Corporation, Chicago, Ill., uses BH "649" vinyl-coated Fiberglas Sleeving in their Stancor power transformers for TV sets, and gains these production advantages:

1) faster assembly — the extreme flexibility of BH "649" makes it easy to slip over the transformer leads.
2) smooth, flexible BH "649" is easier on production personnel. The stiff, harsh sleeving previously used blistered their fingers, slowed up production.
3) fewer rejects — personnel often use the leads as handles, there has been no lead breaking when they are covered with BH "649". Flexible BH "649" doesn't crack in rough assembly handling.

Here are the laboratory tests that Standard gives every shipment of BH "649". A sample is wrapped around a ¼" rod and baked for 4 hours at 250°F. Two others are wrapped around ⅜" square rods. One sample is impregnated with wax and baked for 2 hours at 250°F. The other is impregnated with varnish and baked for 6 hours at 285°F. When the samples of BH "649" are unwrapped there are no cracks, vinyl film condition is excellent, colors are unaffected. The breakdown voltage is always found to be in excess of rated strength.

BH "649" may be the answer to your problem. Get full information on this — and other superior BH tubings and sleevings for electrical insulation. Send facts on your requirements, voltages and temperatures. We'll make recommendations and send you free production testing samples.

Address Dept. W-5

Bentley, Harris Manufacturing Co.
Conshohocken, Pa.

BH FIRST IN

use of Fiberglas
heat-treated Fiberglas
true high temperature flexibility
vinyl-coated Fiberglas
silicone rubber coating
colors in silicone rubber
true Class B (130°C.) protection

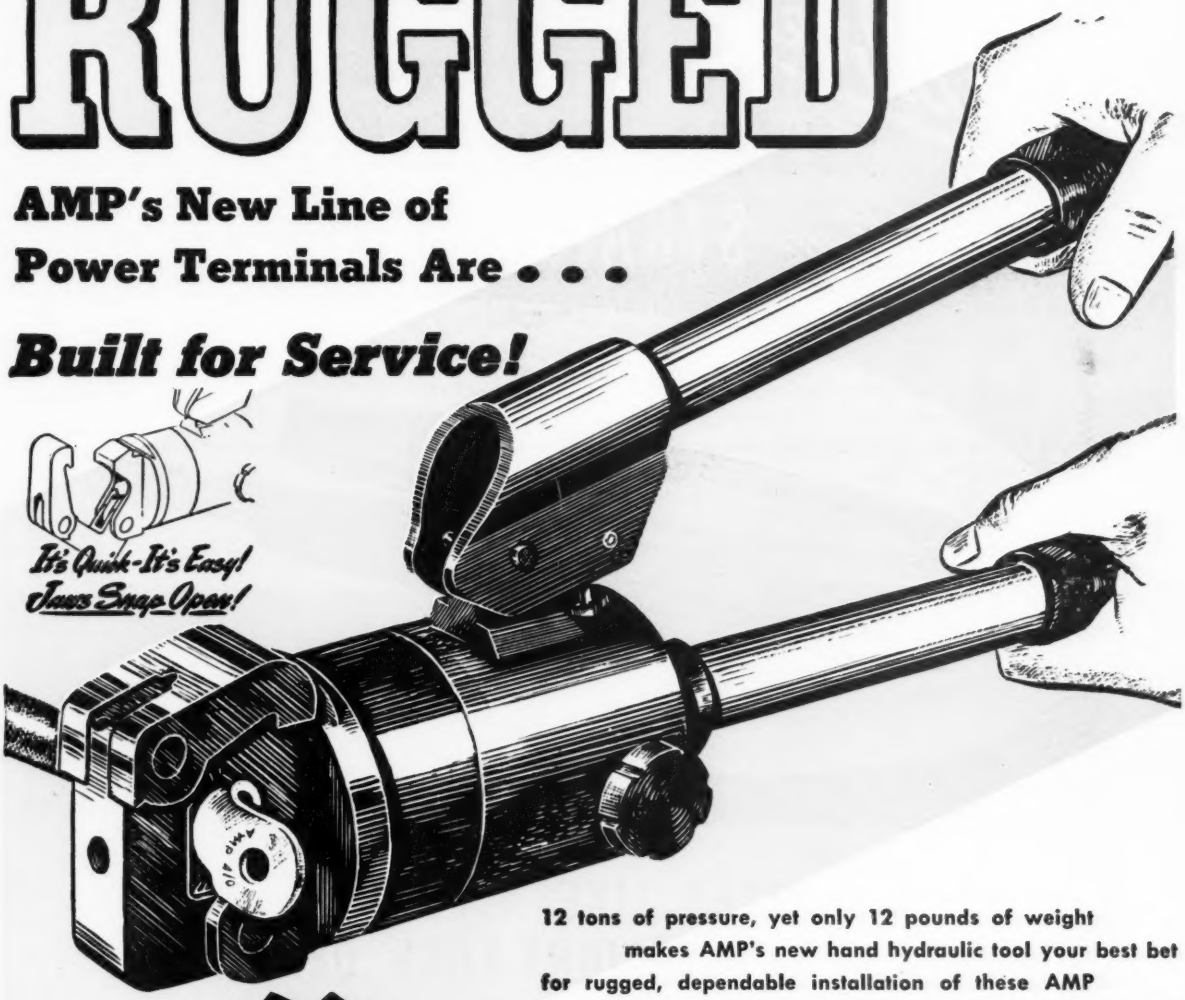
BH *Fiberglas** SLEEVINGS

*BH Non-Fraying Fiberglas Sleevings are made by an exclusive Bentley, Harris process (U. S. Pat. No. 2393530). "Fiberglas" is Reg. TM of Owens-Corning Fiberglas Corp.

RUGGED

AMP's New Line of Power Terminals Are . . .

Built for Service!



It's Quick-It's Easy!
Jaws Snap Open!

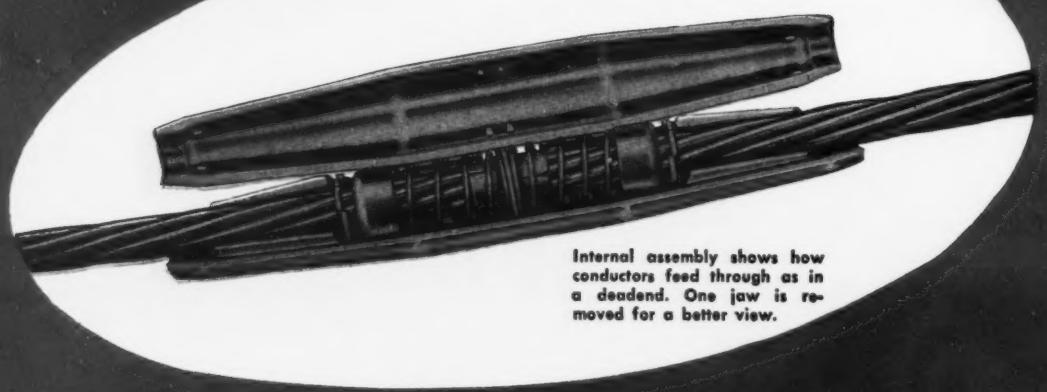
12 tons of pressure, yet only 12 pounds of weight makes AMP's new hand hydraulic tool your best bet for rugged, dependable installation of these AMP *precision-engineered* power terminals. Terminals and connectors are available in all ranges from #8 to #4/0. DESIGNED FOR USE ON ALL SHAPES OF WIRE: SOLID, STRANDED, SQUARE, OVAL, OR COMBINATIONS! Dies snap in and out easily. Tool automatically releases when crimping pressure is reached. Can be used with either pole strap or bench stand if desired. WRITE FOR SPECIAL POWER TERMINAL CATALOG.

AMP

AIRCRAFT-MARINE PRODUCTS INC.
POWER TERMINAL DIVISION
2100 Paxton Street, Harrisburg, Pa.

AMP Trade-Mark
Reg. U. S. Pat. Off.

Reliable LIFTS THE LID on a New STRAIGHTLINE Splice



Internal assembly shows how conductors feed through as in a deadend. One jaw is removed for a better view.

SPLICE OPERATES LIKE A PAIR OF BACK-TO-BACK STRAIGHT-THRU DEADENDS

The new "55" Series Straightline Splice is the surest splice yet devised for strand . . . and *still* no tools are required.

FEATURES:

1. Burred, bent, or out-of-lay strands are either properly located or are refused by pilot cups.
2. Pilot cups prevent jaws from gripping conductor until conductor is "home".
3. Complete closure prevents entry of gritty materials that can interfere with proper functioning of gripping jaws.
4. With only a straight push conductors reach "home" with a definite *feel* and *sound*.

Write for new bulletin giving complete information. Reliable will gladly give you a demonstration — simply ask for it on your company letterhead.

Reliable ELECTRIC COMPANY
3145 CARROLL AVENUE
CHICAGO 12, ILLINOIS

OVER 45 YEARS OF SERVICE TO THE UTILITIES

POWER-LINE CONNECTORS and CONSTRUCTION SPECIALTIES

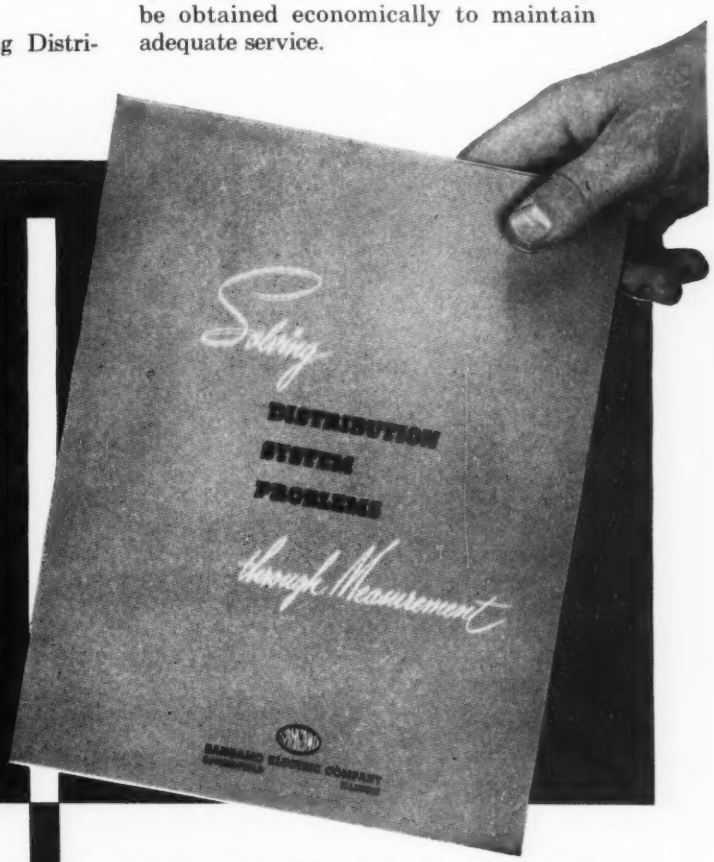
NEW Booklet on Measurement for DISTRIBUTION ENGINEERS

Distribution engineers are daily faced with the complex problem of how to utilize fully the capacity of their present equipment to meet today's ever increasing loads.

The solution of this problem requires specific knowledge of the factors involved. Periodic surveys are costly and do not provide the complete, *continuous* information which can be obtained only by measurement.

Sangamo's new booklet "Solving Distribution System Problems Through Measurement" tells how a number of utilities have solved this problem with permanent installations of Sangamo Thermal Meters for continuous measurement. It tells what types of instruments to use to measure ampere loading in the substation and on the distribution system . . . how KW and KVAR measurements help attain efficient system operation . . . how voltage data may be obtained economically to maintain adequate service.

Here is the answer to your load growth problems. Just clip the coupon for your copy of "Solving Distribution System Problems Through Measurement." No obligation.



SANGAMO

Only Measured Facts are Known Facts

SANGAMO
ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

SM53-4

SANGAMO ELECTRIC COMPANY, SPRINGFIELD, ILLINOIS

Send my copy of "Solving Distribution System Problems Through Measurement"

YOUR NAME_____

TITLE_____

COMPANY_____

CITY and ZONE_____ STATE_____

Teamwork of an electric utility's power sales engineer and a G-E Wire and Cable specialist achieves substantial savings for an Eastern manufacturing plant. The installation of an interlocked armor cable system resulted in a lower installed cost than other methods which had been considered. And continuing savings in yearly power costs will be realized.

G-E specialists help power sales engineers keep their customers up to date on

New wire and cable practices

Giving electric utility power sales engineers the latest information about developments at General Electric is a most important job of our wire and cable specialists. As a result, utility power sales engineers can more quickly offer their customers the benefits of important progress in research, improved installation techniques, and the latest developments in wire and cable.

For example: At a meeting in an Eastern electric utility the G-E wire and cable specialist demonstrated how interlocked armor cable makes possible substantial savings in installation costs and materials. Sometime later one of the utility's sales engineers was asked about the modernization of a factory distribution system. The job seemed to require a cable application similar to that discussed at the meeting.

Then, the utility power sales engineer called in the G-E wire and cable specialist for additional installation information and application data. Together with the plant engineer, the utility engineer and the G-E specialist laid out a new interlocked armor cable system that met present and projected power requirements. After conferences with the city inspector and the fire underwriters, the plan was submitted to the plant's management for approval.

The management of the plant—and of the utility—are particularly pleased with the new system. Reduction in the number of metering points will result in a substantial yearly savings for the customer. Most important, the installed cost of the interlocked armor cable system is far below all previous estimates for other types of distribution considered.

Important progress is being made every day at General Electric. To keep in touch with this progress, talk frequently with our Wire and Cable specialists. They want to help you.

For a copy of the free 20-page booklet on G-E interlocked armor cable write to Section W54-527, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

G-E Wire and Cable specialists are always anxious to keep utility power sales engineers abreast of new wire and cable developments.

You can put your confidence in—

GENERAL ELECTRIC

You could know the plant... 20 years of steady growth ... 20 years of work, brains and money... then in 20 minutes a little fire got away and reduced it all to nothing.

But, your larger size fire hazards can be protected very efficiently at a reasonable cost, thanks to C-O-TWO Low Pressure Carbon Dioxide Type Fire Extinguishing Systems. Simple piping, running from one centrally located storage tank, instantly transports clean, non-damaging, non-conducting carbon dioxide anywhere in the plant area...to flammable liquids, electrical equipment, storage spaces, manufacturing processes and record vaults. Fire at any protected location is extinguished in seconds with an absolute minimum of expense and interruption.

Flexibility is the keynote with these C-O-TWO Fire Extinguishing Systems . . . the low pressure carbon dioxide storage tanks range in capacities from one to fifty tons . . . discharge facilities can either be manual mechanical, manual electric, automatic mechanical, automatic electric or a combination of these . . . especially installed to fit your particular needs. Future plant expansion is easily and economically provided for by initially installing an oversized low pressure carbon dioxide storage tank and adding the supplementary discharge facilities at a later date.

Whether it's fire detecting or fire extinguishing . . . portables or built-in systems . . . C-O-TWO means experienced engineering that assures you of the best type equipment for the particular fire hazard concerned.

WHEN BUSINESS STOPS . . . INCOME STOPS!

Don't take chances with your investment. Secure the benefits of highly efficient fire protection engineering today . . . our extensive experience over the years is at your disposal without obligation. Get the facts now!

C-O-TWO

MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

Squeez-Grip Carbon Dioxide Type Fire Extinguishers
Dry Chemical Type Fire Extinguishers
Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems
Built-In Smoke and Heat Fire Detecting Systems

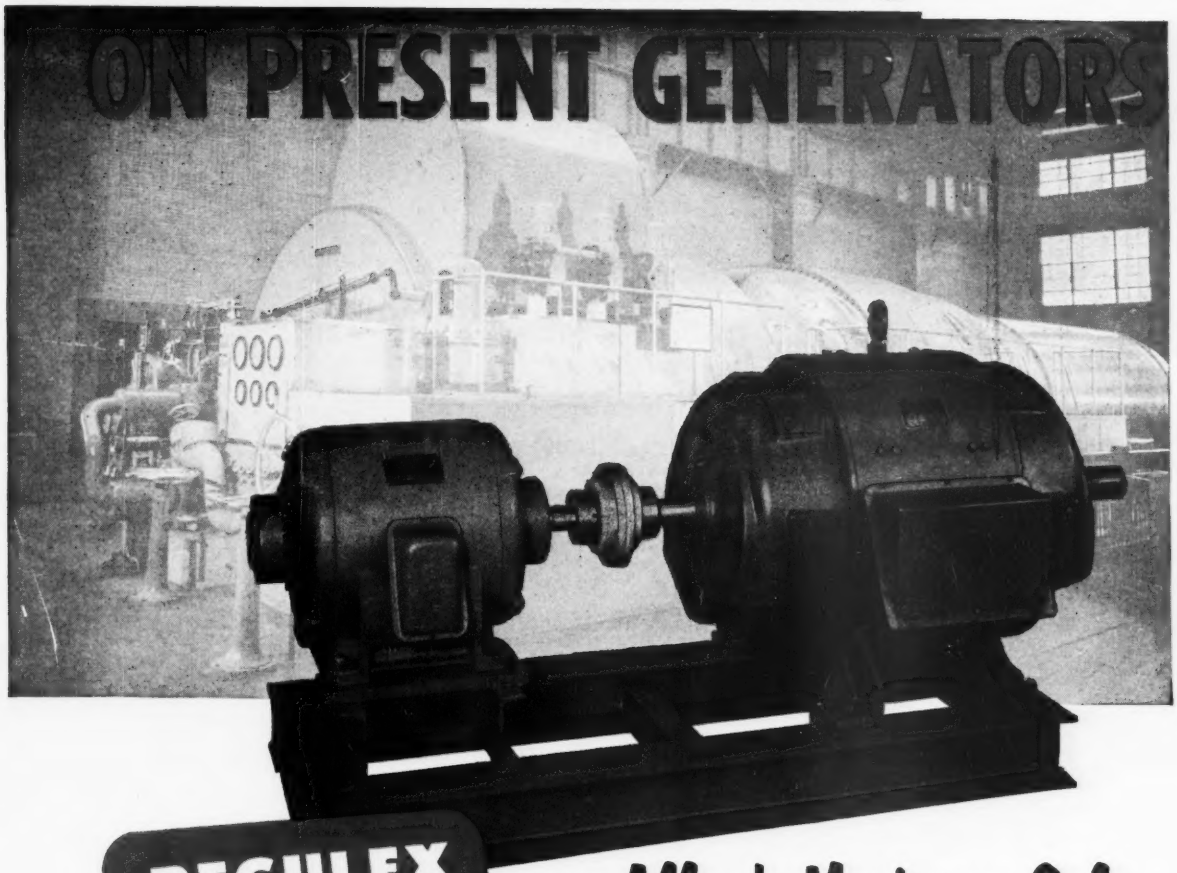
C-O-TWO FIRE EQUIPMENT COMPANY
NEWARK 1 • NEW JERSEY

C-O-TWO FIRE EQUIPMENT OF CANADA, LTD. • TORONTO 8 • ONTARIO

Sales and Service in the Principal Cities of United States and Canada

AFFILIATED WITH PYRENE MANUFACTURING COMPANY

MEET NEW DEMANDS ON PRESENT GENERATORS



REGULEX
Voltage Regulator

Affords Maximum Safe Kilowatt Output at Any Power Factor Loading

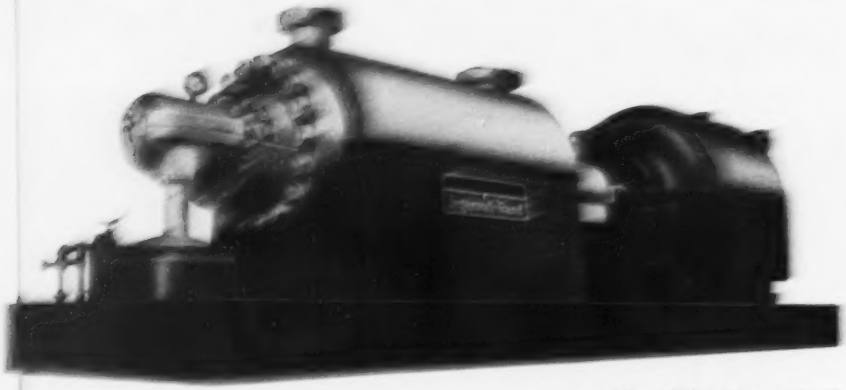
IF GROWING PAINS are taxing your plant productivity . . . if ever-increasing demands require closer regulation for your present generating equipment, consider the new efficiency gained by installing a *Regulex* voltage regulator.

Automatic minimum excitation provided by the *Regulex* voltage regulator permits generator operation close to the stability limit . . . much closer than manual operation allows. The sensitivity and exceptional response of the *Regulex* voltage regulator and associated equipment establish and maintain a safe ratio between generator load and field current . . . increase operating limits at any given power factor load . . . assure the best reactive kva division. This means maximum kilowatt output — more power to sell from your present capacity.

Get all the facts from your A-C representative or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-4018

Regulex is an Allis-Chalmers trademark.

ALLIS-CHALMERS



A Class CHTA boiler-feed pump

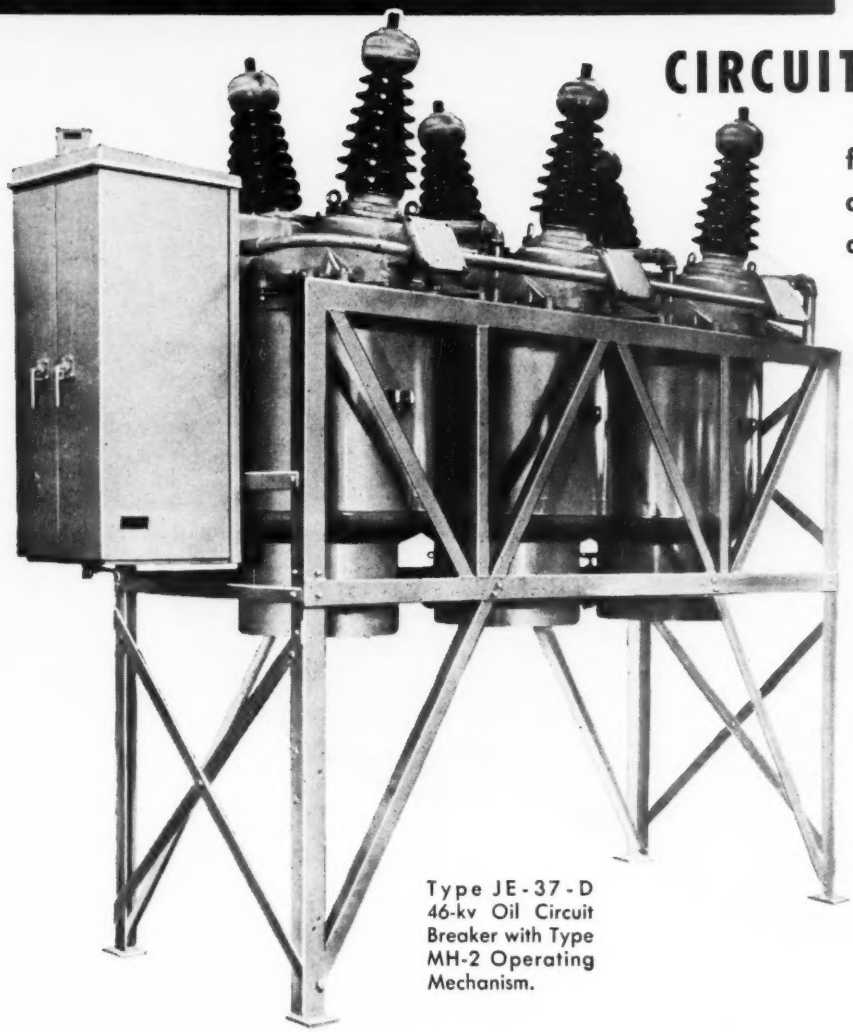
"The common and indiscriminate use of the word **BEST** has caused it to become hackneyed and shorn of its value, and its appropriation is sometimes unwarranted and not endorsed by the public. Yet the producer must have the courage of his convictions with reference to his product, and fail not to speak boldly and openly of it. There is but one CAMERON; it is not of mushroom growth, but has stood the test of use for over fifty years in every clime and under all conditions; it challenges criticism, invites comparison, and commands respect by deserving it, and welcomes every opportunity to be tested."

quoted from the Cameron pump catalog published in 1910

INGERSOLL-RAND COMPANY • CAMERON PUMP DIVISION
11 Broadway, New York 4, N. Y.

Proved Reliability... Verified by User's Reports

Type JE PACIFIC ELECTRIC *Frame-Mounted* CIRCUIT BREAKERS



Type JE-37-D 46-kv Oil Circuit Breaker with Type MH-2 Operating Mechanism.

for Subtransmission and Distribution Lines, and Industrial Loads

23, 34.5, 46, and 69 kv
(Other Styles 7.5 to 230 kv)

•

ELECTRICALLY and MECHANICALLY TRIP-FREE in any position

NEMA and ASA STANDARD

USER'S REPORTS of Pacific Electric circuit breaker performance prove that on the average over the years Pacific's claims of reliable operation and low maintenance cost are realized beyond expectations.

Contributing to this record are that there is only one moving part inside of the tank (the one-piece rotary contact structure); fast and simple latching; low operating current; and that closing when once started proceeds at full speed, unaffected by drop or loss of control voltage.

Also the reclosing is always from full-open position, assuring maximum insulation during the critical surge time that follows an interruption caused by repetitive lightning.

Space does not admit of more than these few hints as to the exceptional performance of these circuit breakers. Catalog 548 explains further.

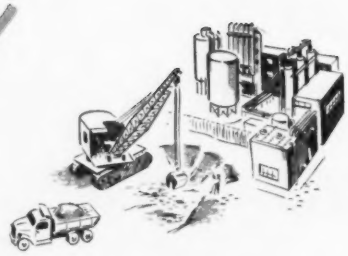
Since 1906

SALES OFFICES or AGENCIES in PRINCIPAL CITIES

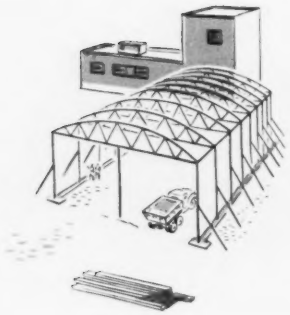
PACIFIC ELECTRIC MFG. CORPORATION

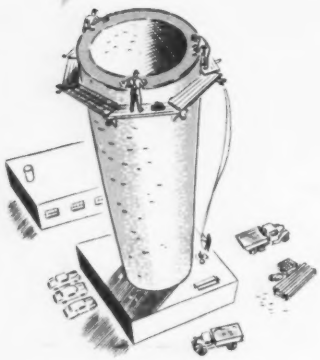
5815 THIRD STREET, SAN FRANCISCO 24, CALIFORNIA
OTHER FACTORIES: SANTA CLARA, CALIFORNIA; GARY, INDIANA

LOAD BUILDERS



INSULATOR SABOTEURS!





Increased industrial activity means increased load demand on power systems—but its by-product, industrial contamination, almost always comes to roost on the insulators that carry the power, and to threaten the dependability of service.

In recent years there have been increasingly frequent reports of leakage current flashovers on major substations and power lines—and of the high cost for changing out or regular cleaning of insulators.

What's the answer to this $64 question? A 25-year-old answer is in the story of Lapp Fog-Type insulator design. Lapp Fog-Type means *longer* leakage distance (on a cost per-inch-of-leakage-distance, cheaper than conventional insulators). More than that, it means a *better* leakage surface, for Lapp Fog-Types have a *uniform* leakage path without narrow shielded hot-spots—and they have a leakage surface exposed to the natural cleansing action of wind and rain.

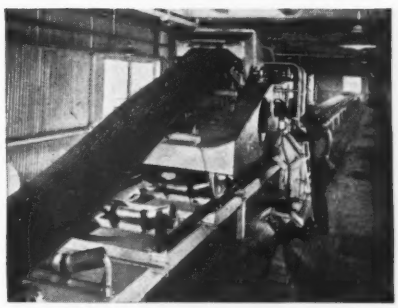
Many companies have standardized on Lapp Fog-Type insulators for use in all areas of industrial contamination. There are units for all line and substation requirements.

Lapp Insulator Co., Inc., Le Roy, N. Y.

General View of Green River Power Station
Kentucky Utilities Company
Sargent & Lundy
Consulting Engineers

Bartlett-Snow coal handling at Green River

● The illustration above shows the first 60,000 KW unit of a plant that is to be enlarged into a 180,000 KW station. The coal handling equipment which was built, and installed, by us to Sargent & Lundy specifications, includes track hopper; duplex feeder; belt conveyors of 300 ton capacity; surge hopper for the storing out conveyor; crusher, weightometer, and sampling; inexpensive open galleries with hinged covers to protect the belt from the weather; and our newest design of motorized travelling tripper equipped to insure dust-free operation. For maximum efficiency and fixed unit responsibility, let the Bartlett-Snow coal handling engineers handle your next job.



Discharge Chutes of this Bartlett-Snow Motorized Travelling Tripper are Fitted with Plows and Rollers that Open and Replace the Bunker Seal Assuring Dust-Free Operation

View of Open Belt Conveyor Gallery. Protecting Hoods are Hinged on One Side and can be Latched in Either Open or Closed Position

DESIGNERS ENGINEERS

BARTLETT-SNOW
CLEVELAND 5, OHIO

FABRICATORS ERECTORS

"Builders of Equipment for People You Know"

Pipes that grew without getting bigger

Cross-section of coaxial cable. To triple capacity, Bell Laboratories and Western Electric engineers had to make 1000 amplifiers work perfectly in tandem . . . feed repeater power along the same cable that carries messages . . . put signals on and off the line at numerous cities along the route without distortion.

Pencil-size pipes carry telephone messages and television across country through the Bell System's coaxial cable. Once, each pipe could carry 600 voices, or one television program. Now it can carry 1800 voices, or 600 voices *plus* a broadcast quality television program.

Yet the pipes aren't any larger. They are being made into triple-duty voiceways by new repeaters, new terminal equipment and other transmission advances developed by Bell Laboratories engineers.

The conversion expense is less than the cost of laying extra coaxial cables. But it calls for highly refined manufacturing procedures, made possible only by close co-operation of Bell Laboratories and Western Electric, manufacturing unit of the Bell System.

In improving the coaxial cable system they created more than 20 years ago, engineers at Bell Telephone Laboratories devised a new way to give America still better telephone service, while the cost stays low.

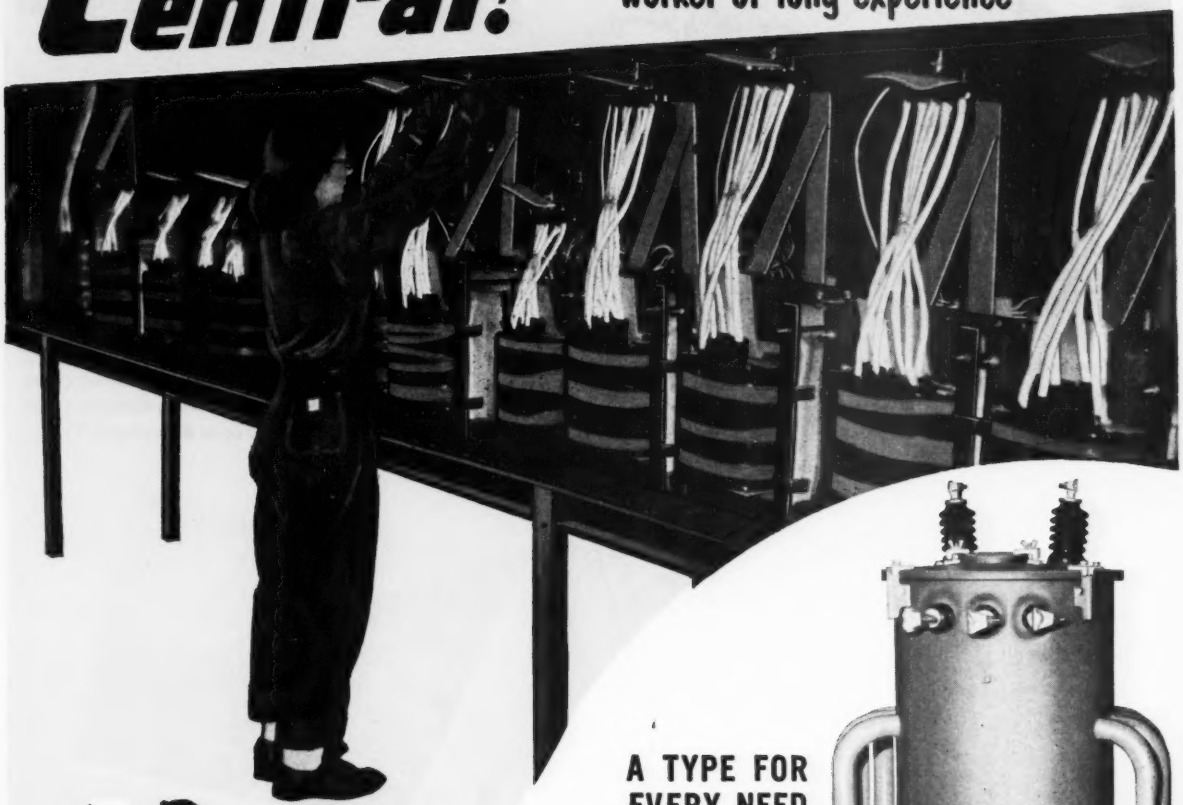
Laboratories engineer tests new triple-duty coaxial system. It marks the first time that telephone conversations and television can travel through the same pipes at the same time. With a wider frequency band being transmitted, big problem was to eliminate interference between the two types of signals.

BELL TELEPHONE LABORATORIES

IMPROVING TELEPHONE SERVICE FOR AMERICA PROVIDES CAREERS FOR CREATIVE MEN IN SCIENTIFIC AND TECHNICAL FIELDS

"TRANSFORMERS?

We know how to make 'em right at Central!" says Tommie Blevins, a skilled worker of long experience



7 Reasons

for superiority of Central Transformers

1. *Skilled, Conscientious Workmanship*
2. *Tried-and-Proven Dependability*
3. *Trouble-Free Performance*
4. *Minimum Maintenance*
5. *Long Life*
6. *Reputation—Thousands in Use*
7. *Prompt, Efficient Service*

A TYPE FOR EVERY NEED

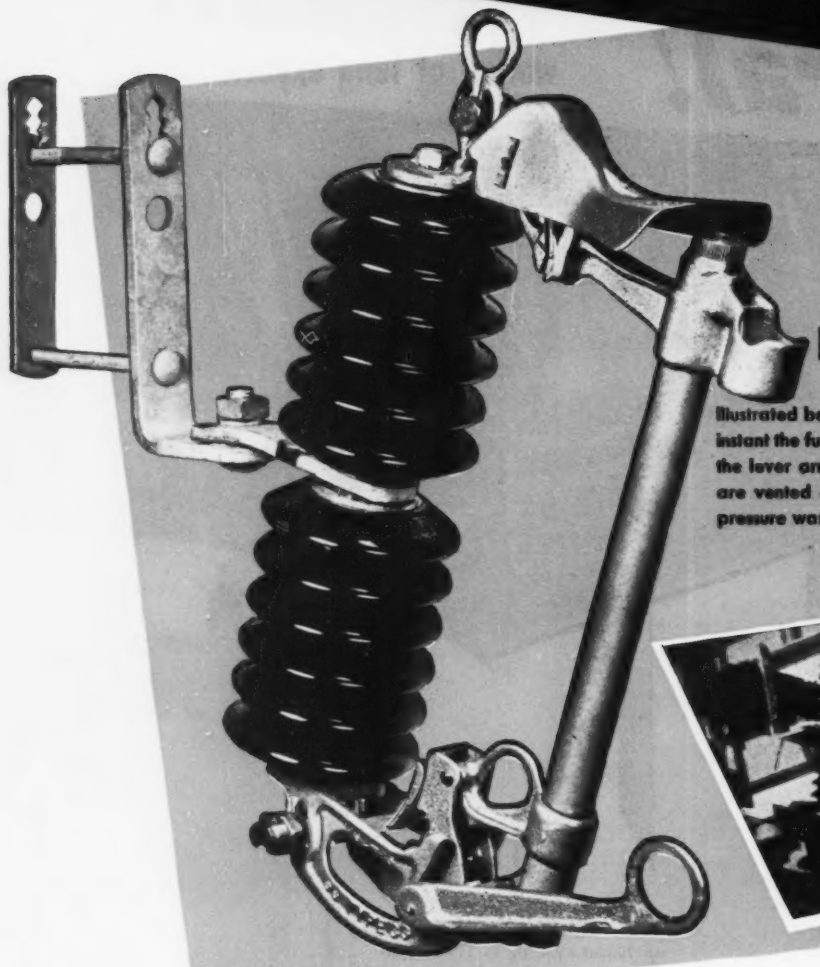
Transformers in sizes from 3 KVA to 10,000 KVA, up to 115 KV primary class.

POLE TYPES: Manufactured in sizes from 3 through 100 KVA, 15 KV primary class, for direct pole mounting, or for use with crossarm hangers . . . illustrated at right is 50 KVA two cover bushings.

Central CTC
TRANSFORMER CORP.

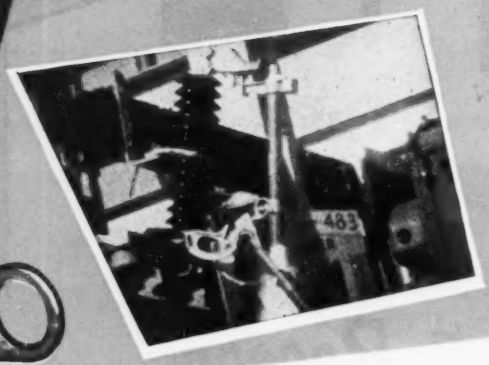
PINE BLUFF, ARKANSAS
SALES OFFICES IN PRINCIPAL CITIES

NEW ADDITIONS to an old



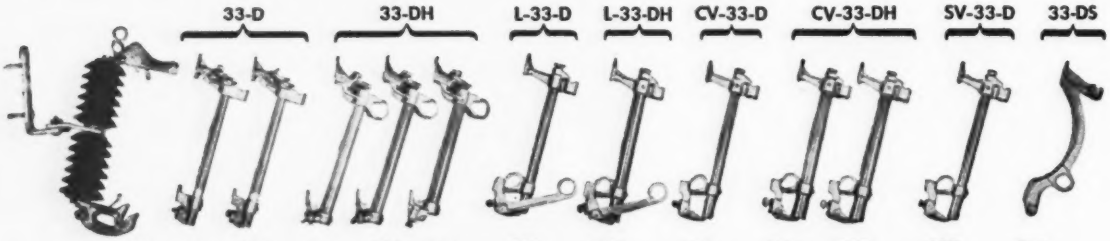
Type L-33-D
Load Break Cutout

Illustrated below is a 15 kv Type L-33-D shown at the instant the fuse link is broken within the tube by pulling the lever arm with a hookstick. In this case all gases are vented at the lower end of the tube since gas pressure was insufficient to open the valve at the top.



interchangeability

Southern States cutouts afford maximum versatility to meet changing system requirements. For each standard duty cutout mounting (as illustrated), 11 fuse holders are mechanically interchangeable in each voltage rating.

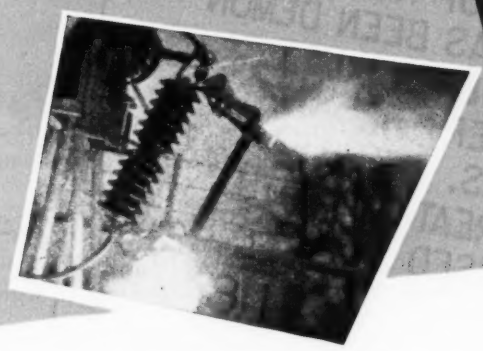


family of cutouts...

Type CV-33-D

Control Vented Cutout

This 15 kv Type CV-33-D cutout is shown interrupting a moderately heavy fault current. In this instance pressure from the gases generated by the arc of the rupturing link is sufficient to open the valve at the top of the tube allowing gases to escape at both ends of the fuse holder.



The Type 33 family of cutouts has new additions in the Types L-33-D and CV-33-D. The Type L-33-D affords full manual load break operation up to the continuous rating of the cutout. Both cutouts feature control venting, plus all the advantages of a line that has been tested and proved through the years.

Load break operation in the L-33-D is accomplished by simply pulling a lever arm with any hookstick. The fuse link is ruptured mechanically within the tube causing the fuse to operate in a conventional manner exactly as under moderate fault conditions.

Both cutouts are designed to use universal button head fuse links and yet retain the advantages of double venting. When interrupting low values of current, the gas pressure is small and all the gas vents from the lower end of the tube. Under heavy fault conditions the gas pressure is great enough to operate a valve in the top of the fuse tube, allowing gases to vent freely at both ends of the tube. The result is greater interrupting capacity for a given size tube.

These cutouts are designed so that their fuse holders are fully interchangeable in Type 33-D and older type fuse mountings.

Southern States Equipment Corp.

HAMPTON GEORGIA

KERITE
CABLE-GRAM
THE ULTIMATE PROOF OF QUALITY IS IN THE CONTINUING TEST OF TIME. FOR ALMOST ONE HUNDRED YEARS THE QUALITY OF KERITE INSULATED CABLE HAS BEEN DEMONSTRATED BY LONG DEPENDABLE SERVICE LIFE UNDER THE MOST SEVERE CONDITIONS. KERITE'S ACCEPTANCE IS GREATEST WITH THOSE WHO HAVE USED IT LONGEST.
THE VALUE AND SERVICE LIFE OF A PRODUCT CAN BE NO GREATER THAN THE INTEGRITY AND CRAFTSMANSHIP OF ITS MAKER.
KERITE
KERITE CABLE
THE KERITE COMPANY—30 Church St., New York 7, N. Y.
Offices also at 122 S. Michigan Ave., Chicago; 582 Market St., San Francisco;
3901 San Fernando Rd., Glendale 4, Calif.; 31 St. James Avenue, Boston

Keeping Up with the Selling Parade

It's a great business, the electric appliance business. Based on the retail prices of 1952, estimates of future sales indicate a market averaging close to $7¼ billion annually, 1953 through 1960. If the maximum predictions presented in this issue of ELECTRICAL WORLD are realized, sales will reach the astounding total of $11 billion in 1960 in contrast to the $6 billion reported for 1952.

What is the significance of the difference between today's appliance sales and those of the coming years? Most likely it is the difference between the selling job being done today and the kind of job that will be done if the industry cooperates on a broad scale to do the very best in selling. And before "the very best" can become a reality the industry must remedy these adverse factors:

1. The lack of information on the effect of selective selling of individual appliances versus promotion of the all-electric home.

2. The lack of selling inherent in areas where little is known about load characteristics of electric appliances.

3. The failure of the companies to set realistic rates that make new business compensatory.

But we are not pessimistic about the industry's decisions. There are signs that it is getting set to carry on an expanded selling program that will dwarf anything ever dreamed of. As Bayard L. England, president of Edison Electric Institute, announced at the recent EEI sales conference at Chicago, there is already a movement afoot for broad scale cooperation between the various units of the electrical industry. This movement will not only include EEI and the National Electrical Manufacturers Association which has already agreed to lead it, but also the distributors, contractors, retailers, and allied groups. Such a constructive step among the selling agencies of our industry can have a profound effect upon future appliance business.

More thought is being given by individual companies to a broader selling program although selective selling of major appliances is not being ignored. At the same time there is a tendency to evaluate load characteristics and the cost of service more accurately. But much progress is still needed in these fields of selling and service pricing.

As C. M. Turner states in his article in this issue, the utilities "should be willing to supply any load for which a customer wants service, so long as we are adequately compensated for the furnishing of this service. If there are those who are not so willing, they may be prejudiced by some past experience or by the lack of knowledge of how to deal with the new or unusual."

In summary, if we are to keep up the selling parade, the electric industry must coordinate selling activities. The utilities must do more appliance sales promotion. Selling must be directed more toward the all-electric home than to individual appliances although these must not be forgotten. Load studies must be made for each major appliance in each service area. And rates must be set to compensate for the cost of serving all appliances.

Public Power Seeks Atomic Power

Ever since the first atomic bomb was exploded, the electric utility industry has been looking forward to the peacetime application of nuclear energy. Over a score of investor-owned companies, assisted by companies in the chemical and electrical manufacturing fields, have been extremely active in urging the federal government to allow them to develop peacetime applications—in particular the production of electric energy by nuclear reactors.

Now the non-federal public power agencies have made a similar request. Speaking for them the Atomic Power Policy Committee of the American Public Power Association has made this recommendation in a letter to Gordon Dean, chairman of the Atomic Energy Commission:

"Because this (atomic) energy potentiality represents one which starts as a natural government monopoly and one where the advantages must be spread ultimately to the people, it is urged that publicly owned electric utilities also be afforded the opportunity of participating in such development contracts (ones similar to those made by the private companies) because of their experience in distributing such benefits to the public. For similar reasons, the publicly owned electric utilities should be recognized and be permitted to adequately share in the application of atomic energy to electric power production when such application has been demonstrated to be appropriate by the results of pilot plant operation."

There should be no criticism of this request. If the benefits of nuclear energy are ever to be made available to all Americans, there must be provisions for participation of non-federal public power agencies. If they are ever to participate, now is the time when there still remains so much development work to be carried on.

But another recommendation in the same letter that the Atomic Energy Commission "assume the responsibility for carrying forward development of a pilot plant" is not in tune with the times. Rather than looking to the federal government to take the lead, the non-federal agencies should themselves be leaders in this field. Then they would not need to worry about being "permitted to adequately share in the application of atomic energy to electric power production."

Furthermore, there is nothing to indicate that if the private companies are successful in developing nuclear power plants the public agencies would not be allowed to share these discoveries just as today they are sharing the contributions made by private companies to the science of electric generation, transmission, and distribution.

Standardize Safety Practices

The rules for accident prevention have been standardized by the 23 member companies of the Pacific Coast Electrical Association. The safety rules under which utility personnel in California, Nevada, Arizona, and Hawaii work now reflect the best thinking of many qualified experts—not of a few in each isolated company.

Heralded as the first and only completed attempt to unify safety practices of a group of operating utilities, these standardized rules are a monument to five years of work by the PCEA Safety Committee and the line supervisors of the member companies. Unprecedented discussion of safety and operating problems was an immediate benefit from the meetings of these men. And these benefits will multiply as the meetings are continued to survey experience under the rules and to prepare additions and revisions to fit changing requirements.

Though 25,000 copies of the standardized rules have been printed for the PCEA companies, each has its own edition with its own cover, pictures of its own plants, and messages from its own officials. These minor changes have made it possible for the smallest company to furnish its employees with an adequate safety manual at a reasonable cost.

The authors call this work a noble experiment. We find it a challenging advance in the battle to protect the lives and physical security of utility personnel. This regional experiment provides an opportunity to prove that safety can be promoted by standardization of safety practices.

Sell—and Sell—and Sell

Do the electric utilities really sell like other units of the industrial community? Do any of them measure up to corporations whose products move only during active selling programs?

The Sales Managers Association of Philadelphia says—yes. And it chose Pennsylvania Power & Light Co as an example. The Howard G. Ford Award for 1952 of the association was presented to PP&L for "outstanding improvement in distribution in the preceding year, as evidenced by such factors as increased sales, increased profits, reduced selling cost, better public relations, and higher standards of sales management."

In presenting the award, special credit was given for the PP&L objective to "serve all customers of the company's 9,500-sq. mile service area so well that the superiority of the American system of free enterprise would be demonstrated even against the threat of Federalized power".

The industry is proud that one of its members was selected from among all companies in the United States to receive this award. Others not honored can still harvest a big reward if they Sell—and Sell—and Sell.

Servants' Entrance, 1953

Standing a little apart from the electrical industry, customers and other industries come up with novel and sometimes more appropriate concepts of the service entrance. A housewife in Long Beach, Calif., remarked to one of our editors photographing an open wire installation, "Are you taking a picture of the electricity?" To be sure the lady was told the purpose of the service entrance.

In a recent advertisement in a national news magazine, American Cyanamid Co coined a new phrase which our editor could have put to good use in Long Beach. Under the picture of a burly lineman connecting up a three-wire installation ran the headline, "Servants' Entrance, 1953." The text went on to say that through this portal entered the equivalent of 6½ full-time servants for the average residential user of electricity.

Public relations and advertising departments of all utilities could well consider this phrase when telling customers the part electricity is playing in raising their standard of living. In 1953, and in the future, the lowly service entrance on even the humblest of homes will be the door through which arrive the housewife's best servants.

THE ELECTRICAL WEEK

The Issue's News Highlights FPC Examiner Law orders issuance of license to New York State Power Authority for St. Lawrence River hydro project.

Wisconsin Public Service President Kohlhopp tells EEI committee meeting utilities can reduce accidents 50% in three years.

Workers agree to return to work at Southern California Edison. Contract talks are being resumed.

Tacoma City Light will water-wall existing boilers at 25,000 kw in No. 2 steam plant so that 20,000-kw turbine generator can be added. Two gas turbines are under consideration to increase further station capacity to 65,000 kw.

Action of Washington State Taxpayers Association in endorsing proposed merger of Puget Sound P&L with WWP is sharply criticized by Chauncey Price, president of Washington PUD Association. He charges taxpayer group does not represent average taxpayer but merely the large ones. He accuses the group of having received "large 'gifts' or dues payments from WWP" and challenged it "to make public such amounts received over last ten years."

Ford Motor Co Fund grants $1 million to University of Michigan for construction of a nuclear reactor on Ann Arbor campus to be used in nonmilitary research.

Latest and most advanced current-carrying capacity laboratory is being installed by Kaiser Aluminum & Chemical Corp, Spokane. To enlarge existing limited data, comprehensive tests will be made to determine characteristics of aluminum conductors up to 3,000 amp ac and dc.

BPA acquires 230-kv transmission line from Pacific P&L which runs between Maupin and Madras in Wasco and Jefferson Counties for $686,224.

Public Service E&G and IBEW, AFL, Utility Coworkers Association, and Office Employees International Union, AFL, agree to 5% wage hike. Union members will vote on its ratification . . . Monthly minimum annuity payments for retired employees of New England Electric System companies have been increased by 20% at no cost to recipient.

Public Service Co of New Hampshire expect to become an independent utility soon . . . Rhode Island Senate rejects proposal to make utilities pay part of cost of rate hearings before the state regulatory authority.

First two transformers for the 330-kv American G&E network have been delivered by Westinghouse to Philip Sporn plant at Graham Station, W. Va., and to Muskingum River plant, Beverly, Ohio . . . Willamette Public Power Association plans to form a new peoples utility district in Mountain States Power area. WPPA's spokesmen say exact boundaries will be determined in conferences of PUD officers and Oregon Hydroelectric Commission.

Off the Washington Wire—Reclamation Bureau begins its fight this week to get the Senate to restore budget funds knocked out by the House. Bureau is pushing for full $177.4 million Eisenhower budget for reclamation. House had cut it to $133.1 million . . . House Public Works Committee studies testimony taken at hearings last week on bill which would permit electric companies to build and operate more electric generation at Niagara. Hearings were to begin May 14.

House Interior subcommittee has approved bill which would abolish the authority of Interior Secretary to authorize reclamation projects without Congressional action. Bill is expected to come before full committee this week. Twelve such projects have been authorized in this way since Congress approved the procedure in 1939. Of those, four are completed, four are underway, and little or no work has been done on the rest.

In his first speech after becoming REA chief, Ancher Nelsen told a Des Moines meeting: "We'll arrive at our goal a lot sooner, and less expensively to the farmer and the people generally, if we can hitch cooperative power, private power and public power together in one team, all pulling in same direction."

American Public Power Association officials lashed out at cuts in federal power budget as APPA convention got underway . . . Twelve southwestern electric companies have proposed a power delivery contract with Interior Department which follows generally the Georgia Power offer. Assistant Secretary Fred G. Aandahl hinted he may have an answer in a few weeks . . . Eisenhower Administration has trimmed $61 million from TVA's proposed $235-million budget for next fiscal year. Cut would delete the proposed Fulton steam plant.

Westinghouse Electric will sponsor the television of one pro football game each week for 19 weeks over some 65 TV stations next fall. Games will be carried over the Dumont network either Saturday or Sunday carrying the team of the week as scheduled.

Congratulations—Standard P&L elects J. Kiefer Newman, Jr, president and Irving Brooks Harris vice president . . . United Engineers & Constructors, Inc, elects F. N. Floyd, John N. Rolston, and Arthur G. Middleton vice presidents . . . Northwest Public Power Association elects Eric Johnson president . . . Saguenay Power elects McNeely Dubose president . . . Revere Copper & Brass elects following vice presidents: Louis G. Glesmann in charge of manufacturing, J. B. Buckley at New Bedford, Mass., division, and Alexander N. Aird at the Baltimore division.

C. D. Allen, president of Allen Engineering Associates, Inc, and owner of Allen-Calleri Corp, both of San Francisco, is elected state president of California Society of Professional Engineers . . . Mark A. Princi, manager of GE's measurements laboratory, West Lynn, Mass., is elected president of Engineering Societies of New England, Inc . . . Alabama Power receives National Safety Council's first place safety award for 1952, topping 18 other firms competing for the award.

New York St. Lawrence License OK'd

- **FPC examiner orders issuance of permit to State Power Authority for construction of hydroelectric project**
- **Decision is subject to review by the commission on its own motion or upon appeal by parties to the proceedings**
- **Under terms of license agency, will build portion of project in U. S. waters; Ontario will go ahead with Canadian part**

Federal license has been ordered issued to the Power Authority of the State of New York for construction and operation of the long-contested St. Lawrence hydroelectric project.

Federal Power Commission Examiner Glen R. Law last week ordered issuance of the 50-year license to New York to build the huge 940,500-kw project in the International Rapids section of the river.

Subject to Review

Law's decision is subject to review by the commission either upon its own motion or upon appeal by parties in the proceedings. Appeals must be filed within 20 days. FPC has an additional ten days to act on a motion of its own. If no review is initiated, it will become effective as a final FPC decision and order at the end of the 30-day period.

Under terms of the license, the New York agency will build the portion of the St. Lawrence power project which lies in U. S. waters. Hydro-Electric Power Commission of Ontario already has approval to build the Canadian portion of the project which would have the same amount of installed generating capacity.

Vital to Seaway

The power project is a vital, and initial step in building the entire St. Lawrence Seaway which would open the Great Lakes to ocean shipping. New York's application to build and operate the power project has gained the backing of President Eisenhower and his Administration. Congressmen now attempting to foster joint U. S. participation with Canada in building navigational aspects of the project have predicated their efforts upon approval of the New York application.

Examiner Law's decision last week was a turnabout from the one he issued in December 1949. In the earlier decision, he held that both the power and navigational portions of the St. Lawrence project should be built by the governments of the U. S. and Canada. This earlier decision was appealed to the courts by the New York Power Authority, but withdrawn last June at the request of both the authority and FPC.

The former Truman Administration was credited with giving New York a second chance for a license to build the power project. The new hearings were conducted late last year, and oral arguments were heard by the examiner Feb. 27 of this year. His decision has been pending since then.

There is still the possibility that the FPC license will be contested in the federal courts. Some lawyers in the case, however, hold that this is unlikely because opponents offered little evidence of their interests during the FPC hearings.

Private Plan Rejected

New York's application was sharply contested by rail, coal, and Atlantic and Gulf port interests during the recent hearings. Public Power & Water Corp of Trenton, N. J., had filed a conflicting application for the development, but this was denied by law on the grounds that the company had not shown financial ability to construct the project.

He also held that the Trenton concern had shown no effective contracts with a Canadian entity which would carry on complimentary construction and operation in Canada. Law pointed out that the government of Canada indicated that the Trenton company would be unacceptable as a partner in the undertaking.

The examiner's decision said a "preference" clause such as requested by one public power and one rural electric cooperative group would be contrary to the public interest. These groups had requested that public bodies and cooperatives be given a priority in purchase of power from the St. Lawrence project.

The New York Power Authority proposes to give preference to sales for eventual use by domestic and rural consumers. Examiner Law said this preference "is equitable and in the public interest, and any proposed modification thereof is contrary to the public interest."

Touchy question of sharing St. Lawrence power with other states was approached in this way: The decision directs the New York power agency to make energy from the project available on an equitable basis to U. S. consumers outside New York within a 300-mile radius.

The authority is to negotiate with utilities and other distributors in the other states, or with state authorities set up for the purpose. In event of disagreement on power allocation, FPC will settle the arguments.

Diversion Problem

New York Power Authority must submit to FPC within one year a report on the feasibility of providing works to permit continued operation of Aluminum Co of America's hydroelectric project at Massena, N. Y., during construction of the St. Lawrence project. Alcoa's plant depends upon water diverted from the St. Lawrence, and the authority had initially proposed to halt this diversion during construction. This proposal was later modified, and it was indicated the diversion might continue during construction.

Examiner Law said the question of who should pay for additional works to provide for diversion during the construction period might well be left for future determination by the FPC or the courts.

License would be issued on the condition that the New York authority begin construction within one year from the effective date of the license and complete it within seven years after construction gets under way.

SKETCHED on a photograph is Idaho Power Co's proposed hydroelectric development of the Oxbow site on the Snake River. FPC hearing on the company's application is set for July 7

Views on McKay Stand Divided

Most Republicans agree with the Secretary's action regarding Snake River development but Democrats score decision as another example of the Administration 'give-away' program

Decision of the Republican Administration to withdraw as an active proponent of a federally constructed Hells Canyon project in Idaho brought an avalanche of sharply divided interpretation and comment.

Interior Secretary Douglas McKay announced the decision recently (EW, May 11, p 6). He said he was withdrawing the petition filed by his Democratic predecessor opposing the Idaho Power Co plan for a conflicting development on the Snake River. Instead, he will leave it up to Federal Power Commission to decide whether the company plan is adequate. McKay, at the same time, offered to furnish FPC any information it may request on the federal plan.

Most Republicans agreed with McKay's action, but some interpreted it to clear the way for federal approval of the electric company proposal. Others thought it would merely remove Interior as a "special pleader" and leave the final decision to FPC, where it has always been.

Democrats seized on the McKay decision as another link in what they have termed the "give-away" chain of Republican policy.

Comments . . . Sample comments:

Republican governors Arthur B. Langlie of Washington, Len B. Jordan of Idaho, and Paul Patterson of Oregon agreed with McKay's stand interpreting it to mean an endorsement for electric company development.

Independent Sen Wayne Morse of Oregon denounced McKay's action as "a shocking betrayal of the public interest."

Republican Sen Guy Cordon of Oregon, an influential lawmaker on Interior matters, said he could not see how McKay's action had changed the situation except that the Interior Department will not be a "special pleader."

"The FPC still has the obligation to make a full and impartial investigation of all sides of the issue," he said.

This point of view was shared by Republican Congressman Hamer Budge of Idaho who thought McKay was correct in leaving "engineering problem" decisions to the FPC.

Same view was shared by Democratic Rep Lee Metcalf of Montana, who advocates federal development. He told a reporter: "I have every confidence that the FPC will rule against the attempt by the Idaho Power Co to take this great natural dam site from the people of Oregon, Idaho, and the United States.

In referring to the Hells Canyon action, Republican Gov Earl Warren of California said McKay had assured him that the new power policies will not jeopardize future power development in California.

Democratic Disapproval . . . The two Democratic senators from the state of Washington hit hardest at the McKay decision.

Sen Warren Magnuson stated that it was "the most extreme example to date of the current Administration give-away program."

Magnuson's junior colleague, Sen Henry M. Jackson said he feared the McKay policy "may mean the end of multiple purpose power projects."

Democratic Rep Gracie Pfost of Idaho, said she was "shocked" by the McKay announcement. She said the Eisenhower Administration "may stymie the construction of Hells Canyon Dam temporarily but there is no doubt in my mind the high dam will eventually be built. The people will insist on it."

The reaction of the private utility industry to McKay's stand on Snake River development was unanimous. Electric companies endorsed the Secretary's decision not to oppose Idaho Power's plan as a step in the direction of less federal activity in the power field. (See page 135 for statement by B. L. England at PUAA meeting.)

Idaho Power Pres T. E. Roach said McKay's announcement that "the Hells Canyon controversy will be decided by the Federal Power Commission on its merits after a full consideration of facts determined by competent engineers is a proper decision which will result in what is in the best interests of electric users and taxpayers alike."

"We are hopeful there will be no further delays in the technical hearings the commission has now scheduled for July 7," Roach said.

McKay's decision has left unchanged the company's plans for building 75,000 kw plant if Oxbow license should encounter any further delays.

Wisconsin Public Service Pres C. E. Kohlhepp tells EEI committees . . .

Utilities Can Reduce Accidents Greatly

Utility accidents could be cut 50% in three years, if the full support of management, operating departments, and the Edison Electric Institute is applied, declared C. E. Kohlhepp, Wisconsin Public Service Corp. He spoke before EEI's Accident Prevention and Transmission and Distribution Committees at a recent joint meeting in Chicago.

"Our record as an industry has been lousy," he said. "We are killing men unnecessarily. If the whole industry had achieved the record of the five best companies, 920 of the 1,300 men killed between 1941 and 1950 would still be alive."

Morale Is a Factor . . . Companies with low frequency rates, said Kohlhepp, have excellent employee morale and fine cooperation between management and labor. "I believe the converse is true," he added. "If there is friction men cannot work safely."

A successful safety program needs top management's support, he continued. Not enough top executives take adequate interest. "When they don't," he told the safety men, "it's your job to wake them up."

An important requisite of a good safety program, he declared, is to place responsibility for preventing accidents on supervisors. Accident prevention cannot be separated from operation, he said. "As the top man thinks and acts, so will his men think and act."

A panel of safety and operating men tackled the subject of shocks and falls which account for many accidents. Better design for adequate climbing space and less congested pole tops were cited as a contribution to safety in some instances.

Supervisors' Responsibility . . . The only way to build an accident-proof line is to eliminate it, said one panel member. Accidents usually occur on clean poles, so lapse of memory about safety is the problem, he said. Some improvements may be possible through better design and maintenance of safety belts and climbing irons. But, he added, the first-line supervisor is the key to safety.

If the industry accident rate is to be brought down some steps must be taken to interest executives of those companies having the high frequency rates, the Accident Prevention Committee agreed.

Of 152 fatal accidents in the industry in 1952, 83 were electric shock and burn accidents, the committee reported. Of these, hand and arm contacts were the cause of 38. They were the result of men working without rubber gloves and failure to cover up with rubber goods.

Low voltage systems were recommended for lights used in working in boilers and condensers where wet conditions prevail.

The Transmission and Distribution Committee is proposing dimensional standardization of compression fittings and tools for aluminum conductors. And several manufacturers indicated a movement in that direction. But protection against corrosion remains an unsolved problem, according to the opinions expressed by several utility men at the meeting.

IN THE EEI PICTURE: With Kohlhepp are W. F. Brown, left, chairman of Accident Prevention Committee, and J. A. Pulsford, right, chairman of Transmission and Distribution Committee.

Air Conditioning Boom . . . Room air conditioners continue in heavy production, said J. W. Anderson, Philadelphia Electric Co. Upwards of 50 manufacturers plan to sell 200,000 installations in 1953 and predict 50% growth each year thereafter.

Particularly in southern cities, reported R. F. Scott, Southwestern Gas & Electric Co, television is keeping people home and they install air conditioning for comfort. Shreveport alone has over 30,000 hp connected, and 75% are ¾-ton units. Peak load occurs now in summer afternoons, he said, and the added load shows 41% power factor. In 1952, his system spent $750,000 for shunt capacitors, Scott reported.

The lowering power factor of residential load was confirmed by Bryce Brady, Oklahoma Gas & Electric Co, who reported on a 14-company survey. All 14 replies agree that power factor standards are needed for air-conditioning equipment, preponderantly favoring 90%.

Cooperation between utilities and equipment manufacturers to achieve better power factor was urged by H. I. Miller, EEI Rate Research committeemen from Wisconsin Public Service Corp. The cost of correction must be paid by those customers who use the equipment, he said, rather than a general rate increase.

The rapid increase in three-phase motor application has led to preparation of Polyphase Motor Starting Current Rules. A draft joint report was presented for discussion by J. W. Anderson, Philadelphia Electric.

Tree Problem . . . Growing interest in aerial cable for overcoming service interruptions caused by trees was evident in a panel discussion. Tree wire, it was reported, is also used, but only up to about 5 kv. The alternative is heavy and frequent tree trimming, but even the tree expert members of the panel seemed agreed that cable or tree wire should be used in difficult trimming locations. Several speakers indicated that the increased initial cost of aerial cable may pay off in lower maintenance costs and a reduction in trimming costs.

Contact deterioration of porcelain cutouts is causing numerous interruptions, reported W. J. Witte, Consolidated Gas Electric Light & Power Co. Tests on 4,450 while carrying load indicate that 22% become defective within 12 years, he said. He advocated testing the heavier loaded 50% of cutouts in service every six years to detect deterioration before interruptions occur.

Underground vs. Overhead . . . So-called low-cost underground distribution for residential areas still costs 36.5% more than overhead for the same system said F. C. Van Wormer, General Electric Co. Van Wormer described the elements of such a system and said that since underground does cost more than overhead, all possibilities for reducing costs, such as direct burial of cable and others, should be considered. Length of block and load densities were two of the important factors influencing design, he said.

Cost figures were questioned in the discussion and the question of who pays the cost was raised.

Sheath corrosion causes 25% of all cable failures according to the report presented by C. T. Nicholson, Niagara Mohawk Power Co. The report was based on a survey conducted by the EEI committee. Discussion indicated that presence of a street railway or trolley bus system greatly influenced the corrosion problem and that electrolysis problems should be reviewed following any change in these systems. Corrosion apparently increased on several systems after street railway systems were abandoned. Committee activities of interested parties helped solve the problem in at least, it was reported, two cities.

A decision is expected soon with regard to the proposed publication of an underground system reference book, D. C. Hawley, Kansas City Power & Light Co and chairman of the underground group subcommittee, reported.

Cable failure rate in 1951 was not significantly different from the average for the previous years, said E. B. Shew, Philadelphia Electric, who presented the report. Trouble rate for joints was up from 1.5 per 1,000 joints to 2.2 and this was attributed to an increase in the rate for single conductor cable joints. Terminal failures were approximately the same as in previous years.

Attending sessions at EEI Accident Prevention and T&D Committee meeting

CONFERRING at joint meeting of the two committees (left panel) are D. A. Campbell, Jr, Pennsylvania P&L; J. W. Gehreke, Scranton Electric; and W. J. McLain, Dayton P&L. Man with back to camera is W. M. Penney, Union Electric. In the right panel R. F. Douglas, Detroit Edison, (left), greets J. W. Anderson, Philadelphia Electric, and vice chairman of Transmission and Distribution Committee

EEI Parley to Hear A-Talks

Walker Cisler and Gordon Dean will take part in session at institute's annual meeting set for June 1-4

The role of atomic energy in generation of electric power will be analyzed at the Edison Electric Institute's 21st annual convention scheduled for June 1-4 at Atlantic City, N. J.

Participants in the discussions will be Walker L. Cisler, president, Detroit Edison Co; Gordon Dean, chairman, Atomic Energy Commission; and Dr John Dunning, dean of engineering, Columbia University. In addition, a report of EEI's Committee on Atomic Energy will be made by Edgar H. Dixon, chairman of the committee, and president of Middle South Utilities, Inc.

Atomic Energy Development . . . Cisler will discuss the electric power industry's responsibility in the development of atomic energy as a source of electric power. AEC's view on its development will be presented by Chairman Dean. Broad aspects of use of atomic energy for generation of electric power will be explored by Dunning.

Today's regulation of utilities will receive attention from Eugene S. Loughlin when he speaks at the convention's first general session. Loughlin is president of the National Association of Railroad and Utilities Commissioners, and chairman of the Connecticut Public Utilities Commission. EEI Pres Bayard L. England will also address this session.

On the Program . . . Other speakers will be Grover C. Neff, president, Wisconsin Power & Light Co; H. E. Dexter, vice president, Central Hudson Gas & Electric Corp, F. E. Verdin, director of personnel, Cleveland Electric Illuminating Co, Robert Gros, manager, publicity and advertising, Pacific Gas & Electric Co; J. R. Hartman, vice president Cincinnati Gas & Electric Co; C. E. Oakes, president, Pennsylvania Power & Light Co; and W. W. Lynch, president and general manager, Texas Power & Light Co.

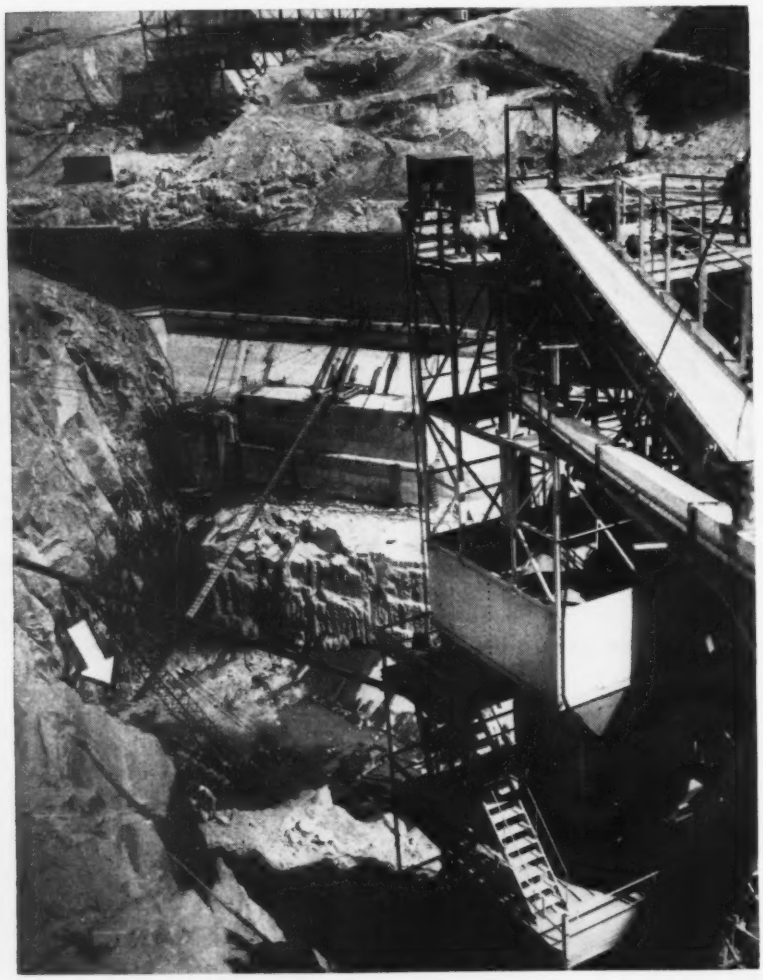
L. V. Sutton, president, Carolina Power & Light Co, and N. B. Gussett, president, Iowa Power & Light Co, will also speak at the convention.

A report of the Prize Awards Committee will be made by its chairman, Harry Restofski, vice president, West Penn Power Co.

Coffin Award . . . The Charles A. Coffin Award will be presented Wednesday evening, June 3, at the Warner Theatre on the Boardwalk. Following the presentation, Fred Waring and His Pennsylvanians, through the courtesy of General Electric Co, will offer a varied musical program.

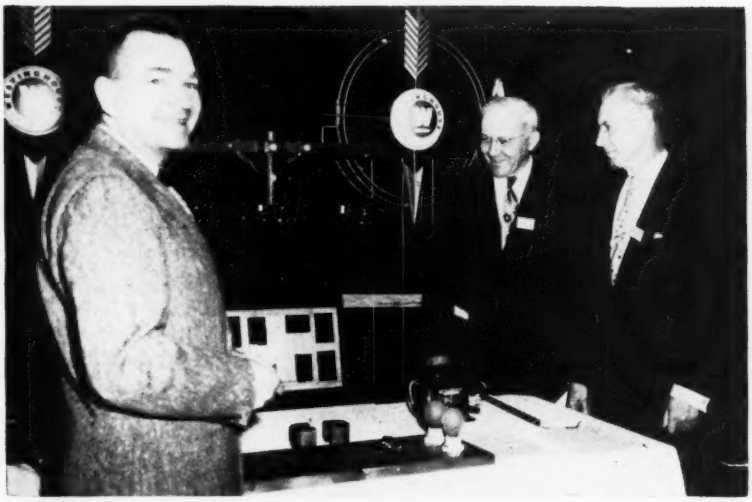
On Tuesday, June 2, at noon Bendix Home Appliances, a division of Avco Manufacturing Corp, will welcome the ladies to a luncheon in the Carolina Room of the Chalfonte Hotel, during which a fashion show will be held. At noon of the following day, EEI will play host to the ladies at a luncheon in Trimble Hall, Claridge Hotel.

"Unconventional Daily" will be published for the seventh consecutive year by a staff of Electrical World editors. The morning tabloid will carry the list of delegates and give complete coverage of the convention.



Power Plant Going Underground . . .

. . . . into this hole excavated at the Folsom Dam on the American River near Sacramento, Calif. To cost more than $21 million, the hydroelectric plant will have three 54,000 kw generators. The dam abutment on the east side of the river is shown in the upper left corner. Arrow at bottom left indicates where the first bucket of concrete was poured for the foundation.



MODEL KITS for transformers are inspected at public power meeting by Gus Norwood, executive secretary; Owen Hurd, outgoing president; and Vivan Jones, Tacoma City Light

Public-Private Alliance Urged

Groups should supplement one another's activities in Pacific Northwest, Raver tells public power organization.

As the Eisenhower Administration defines and limits its power responsibility in the Pacific Northwest non-federal utilities should be ready to assume the initiative, Dr Paul J. Raver, administrator of Bonneville Power Administration, told the Northwest Public Power Association at its annual meeting in Spokane, Wash., May 6-8.

Raver called upon local public and private power groups to share responsibility to complement one another. "Federal, public, and private bodies must work in concert to serve everyone with adequate facilities, at reasonable rates, and without discrimination," he said.

Differences between power agencies and other groups having interest in the area's rivers must be resolved, continued Raver. In pointing to fish and game organizations who oppose building of Tacoma's City Light's Cowlitz project and Portland General Electric Co's Pelton project, he said, there is room for understanding on both sides.

Lastly, he urged that public and private groups work together in stressing need for and timing of additional projects to be provided in the Northwest by the federal government as a joint partner.

Federal Help Urged . . . Stating that distributors of federal power should participate in and guide formation of rates, Vivan Jones, Tacoma City Light, offered these points for consideration in anticipation of changes in BPA's wholesale rate schedules in December, 1954:

- Rate differentials should be set to enable distributors to serve industrial loads without fear of federal competition or interference.
- BPA should re-examine its policy of bringing in major industrial loads on an interruptible and "calculated risk" basis, to be firmed up later.
- "At-site" bus bar sales policy, designed around the original single federal dam development, may have to be abandoned because of interconnected and interdependent nature of present transmission grid and plants.
- All public and private utilities in the Northwest should be given credit for their portion of firm power created through operational diversity of the Northwest Power Pool.
- Where BPA sells power at transmission line voltages, suitable high voltage discounts should be given to purchasers.
- Policies of BPA have appeared to lose sight of the fact that non-federal utilities have basic public utility responsibility to their customers to set their rates and administer their affairs from local level.
- To take advantage of seasonal run-off water in Columbia River, BPA should establish a suitable rate to encourage seasonal reservoir filling.

Warning Sounded . . . Former Sen C. C. Dill stated that the public power movement has become a kind of political religion, "and you can't be on both sides of the fence." He warned that the new Administration has taken steps which signal no new dams, no new transmission lines, and no new funds for rural electric cooperatives.

He urged public groups to consider building new projects jointly with the federal government. Local groups could finance and build the power portion of the project through issuance of revenue bonds, and Congress could appropriate funds for flood control, navigation, etc., the former Senator remarked.

Co-op Changes Asked . . . Eric Johnson, Wasco Electric Cooperative, The Dalles, Ore., called for a change in the Rural Electrification Administration law to permit rural co-ops to raise money through revenue bonds or other direct-financing means, while Gus Norwood, NWPPA executive secretary, said a bill is being drafted in Oregon to permit cooperatives to become municipal corporations. This will allow them to borrow money from non-federal sources and to provide service to customers who now cannot be served under the REA act.

Ted Waller, Inland Empire Rural Electrification, Spokane, said consensus of directors of the National Rural Electric Cooperative Association is that an increase in REA interest rates is possible. He added that Fred G. Aandahl, assistant Secretary of the Interior, reportedly said the Bureau of Reclamation will continue building transmission lines to tie bureau projects together, but doubted that more lines will be built to bring power directly to distributors.

More Power from Puget Sound P&L's Rock Island Dam

Sixth additional 27,500-kw generator is expected to go on the line at Rock Island Dam powerhouse by June 1. The Puget Sound Power & Light Co dam (above) stretches across the Columbia River near Wenatchee, Wash. When the last new unit goes into operation the project will have capacity of 245,000 kw. First of additional units went on the line last September, the fifth in March.

The expansion program at Rock Island was financed by Chelan County PUD, through agreement with Puget Power. The PUD has contracted to furnish 120,000 kw of firm power through June 30, 1955, to Aluminum Co of America's nearby aluminum reduction plant, with reduced amounts provided for delivery thereafter until contract expiration on July 1, 1957.

Depa to Close Up

McKay abolishes mobilization agency for utilities at the close of business on June 30

Defense Electric Power Administration has orders to close up shop June 30.

Order abolishing the agency was issued May 8 by Interior Secretary Douglas McKay on recommendation of James F. Davenport, Depa Administrator. Depa, mobilization agency for the electric utilities, was established under interior jurisdiction Dec. 4, 1950. McKay's order closing the agency reads in part:

"The Defense Electric Power Administration is abolished as of the close of business on June 30. The administration will proceed at once in conformity with applicable laws and regulations to terminate its activities as expeditiously as possible . . . Any unfinished administrative work as of that date will be assumed by the Office of the Administrative Assistant Secretary (of Interior)."

Functions . . . Main functions of Depa have been: (1) allocation of controlled materials for defense electric power construction projects; (2) keeping tabs on the nation's power supply and requirements; (3) passing upon applications by electric utilities for certificates of rapid tax amortization.

Created under authority of the Defense Production Act, Depa at first administered a loosely organized material priority system. In July 1951 the agency began administering the controlled Materials Plan for the electric utilities. CMP is to be dropped June 30 with the shift back to a materials priority system applicable only to defense and atomic energy projects.

Approximately 50 electric generating projects relating to the atomic energy program will continue to be eligible for priority in use of strategic materials after June 30, but it has been determined that Depa is not needed to administer this relatively small program. While a final decision has not yet been made, it is believed that these functions may be absorbed by the Office of Defense Mobilization.

Gas Line to Plant Denied

Federal Power Commission has denied Arkansas-Louisiana Gas Co's application to construct six miles of line to make available additional natural gas to the Lake Catherine steam plant of Arkansas Power & Light Co. Pointing out that the proposed line was designed to serve an additional 30 million cu ft daily to the plant. FPC said that evidence of record did not show that the gas company had sufficient reserves to meet requirements of its present consumers for a reasonable period of years. The Lake Catherine station supplies power to aluminum plants in the area.

California Utility Strike Ends

IBEW workers agree to return to work at Edison company while collective bargaining is resumed

Strike against Southern California Edison Co by Local 47, IBEW, AFL, which began March 10, ended with ratification May 10 of a company-union back-to-work agreement. Strikers were scheduled to return to their jobs May 12.

There are 3,700 employees in the union bargaining unit.

The agreement covered only terms of ending the strike and was not a contract. It called for immediate resumption of bargaining, which had been suspended since the strike began. Workers will return to work at the wage rate increase offered them before the strike was called and given all on-the-job employees during the strike—5% or $15 a month, whichever is greater. The union had asked 25¢ an hour increase. The union shop issue, one of the chief points of difference, was not mentioned.

The union agreed not to call or sanction any strike, slow-down or stoppage of work during the term of the agreement—which will last until a new contract is executed.

Both company and union agreed not to discriminate against any employee for his part in or lack of part in the strike. But the company is to "have no obligation to retain in service any person who is hereafter so non-cooperative or so antagonistic towards the company and towards those with whom he must work that he cannot live up to his primary obligation as an employee."

Will Withdraw Charges . . . Both sides agreed to withdraw charges of unfair labor practices lodged with National Labor Relations Board.

First three weeks of the strike were marked with bitter recriminations and company charges of sabotage. Five Edison transmission towers were dynamited. The union denied responsibility for the dynamitings or any other sabotage.

Edison refused to bargain during the strike on the grounds that "collective bargaining cannot be conducted under coercion." There were no direct company-union meetings until about a week before the end of the strike.

An injunction issued in Superior Court against certain union picketing practices will remain in effect until signing of a new contract.

The agreement recognized that "the company is engaged in a public service requiring continuous operation," and it is agreed that recognition of such obligation of continuous service during the term of this agreement is imposed upon both the company and the union.

Bureau of Reclamation Trimming Staff 8-10%

Bureau of Reclamation is trimming its 13,000-man staff by 8 to 10% beginning immediately.

This means that at least 1,000 and possibly as many as 1,300 employees will be removed from the bureau payroll to bring it in line with budget reductions anticipated for the fiscal year beginning July 1.

Hardest hit by the economy move will be economists, marketing specialists, and information specialists employed by the bureau. These positions were singled out by the House Appropriations Committee for the largest reductions.

Men in these positions are concerned chiefly with project planning, operation and maintenance, and electric power activities.

However, there will also be a general reduction in force which may hit harder at the jobs in the higher civil grades.

In setting a schedule for reducing personnel, Assistant Interior Secretary Fred G. Aandahl said he is acting "in accordance with Congressional expressions . . ."

Texas Tornadoes Damage Distribution Systems

Tornadoes which struck Waco and San Angelo May 11 caused damage to the distribution systems of two Texas utilities in those cities. Some transmission lines were downed but generating facilities were unaffected.

Texas Power & Light Co reported that in Waco several blocks of its distribution lines in the hard-hit downtown area were completely wiped out by the tornado. Many lines in other parts of the city were knocked out also but repairs were made quickly. The company rushed extra crews into Waco and between 250 and 300 men were engaged in repairing the lines. By May 12 most of the city was in service.

Twenty-four portable generating units were put in use by Texas P&L to supply power to hospitals and other emergency facilities in badly stricken area. The company's generating plant in Waco and transmission lines there were not damaged.

West Texas Utilities Co reported light damage to its lines in San Angelo. The damage was confined chiefly to the distribution system but a few transmission lines were knocked down.

POWER BRIEFS

- A Federal Power Commission examiner has recommended licensing Namekagon Hydro Co to build and operate a proposed 1,500-kw hydroelectric project on the Namekagon River in Washburn County, Wis. Decision is subject to review by the commission.
- British Columbia Electric Co, Ltd, has announced a $12-million project to add 120,500 hp to their present system. A new unit at the Bridge River plant will account for 62,000 hp and an automatic power station 25 miles to the east will develop 58,500 hp. Construction will start within the next two months.
- For licensing purposes, Federal Power Commission has found the original cost of Grand River Dam Authority's project in Mayes and Delaware Counties, Okla., to be $14.1 million. The state agency had claimed the gross original cost of $21.4 million, but FPC disallowed inclusion of a federal grant in figuring the cost.
- Tennessee Valley Authority is drawing down the level of its Chatuge Lake in preparation for construction of a 10,000-kw generating plant at the outlet of the dam. Provisions were made for the unit when the dam was built in 1941. Water from Chatuge will be stored in Hiwassee Lake, immediately below.

MEETING REPORT

EEI Head Sees New U. S. Power Tack

• England, at Public Utilities Advertising Association Convention, says industry welcomes Administration's decision not to push federal development of the Snake River

• Walter G. Heren is elected president of association; winners of Better Copy Contest are announced

Decision of the Eisenhower Administration to turn its back on federal development of Hells Canyon Dam and the Snake River in Idaho was welcomed by the private power industry, Bayard L. England, president of Edison Electric Institute, said last week.

He addressed members of Public Utilities Advertising Association at their annual convention in St. Louis.

"The Hells Canyon action," he said, "is the first indication in 20 years that the government is not going to compete with power companies as it has in the past."

Interior Secretary Douglas McKay had indicated the Administration's stand by withdrawing the department's opposition to a proposal Idaho Power Co now has before Federal Power Commission to build a low-head dam at Oxbow on the Snake. The private dam would in effect cancel out the federal project (EW, May 11, p 6).

An Example . . . England said Idaho Power's proposal was one example of a series of things the utilities have been doing to prove private capital is willing and able to undertake large development projects in the public interest.

"This is the time," he said, "when we must set to work to build the confidence of the American people in the nation's utilities to a new high level, to insure their continuance under any future conditions as foundation stones of the immensely productive American free economy. This is a task in which we are all deeply concerned, but which will bear most heavily on the advertising and public relations executive."

Survival of utilities under free enterprise depends on good public relations, he asserted.

A utility executive himself (president of Atlantic City Electric Co), England said he feels the three "priceless ingredients" of good public relations are deeds, character and neighborliness. Public relations, he observed, is what you do and not what you say.

"Utility managements, as well as their advertising and public relations people," he commented, "must keep these simple, but not easily concocted ingredients always in view."

Heren Elected . . . At a business session that wound up the convention, Walter G. Heren, director of advertising and public relations for Union Electric Co of Missouri, was elected president (See News About People, p 242). He succeeds Paul L. Penfield, supervisor of advertising, Detroit Edison Co.

Winners of the PUAA Better Copy Contest were announced at the meeting. The contest attracted more than 2,000 entries in 17 regular and five special classifications. Companies with 400,000 or more customers were entered in Group A; those with about 150,000 or more in Group B, and those with less than 150,000 in Group C. First prize winners in each classification, by group, were as follows:

Complete Campaign Program—A, Cincinnati Gas & Electric Co; B, Wisconsin Electric Power Co; C, Tampa Electric Co.

Public Relations Newspaper Advertising—A, Philadelphia Electric Co; B, Arizona Public Service Co; C, Mississippi Valley Gas Co.

Single Newspaper Advertisement—A, Northern States Power Co; B, Wisconsin Power & Light Co; C, Pacific Power & Light Co.

Employee Magazine—A, Detroit Edison Co; B, United Illuminating Co; C, Hartford Electric Light Co.

Employee Newspaper—A, Consumers Power Co; B, Arizona Public Service Co; C, Central Hudson Gas & Electric Corp.

Series of Direct Mail Pieces—A, Consolidated Gas, Electric Light & Power Co of Baltimore; B, British Columbia Electric Co, Ltd; C, Portland Gas & Coke Co.

Single Advertising Piece Distributed to Customers—A, Cincinnati Gas & Electric Co; B, Dayton Power & Light Co; C, Washington Water Power Co.

Printed Material for Dealer Promotion—A, East Ohio Gas Co; B, New Orleans Public Service, Inc; C, Central Hudson Gas & Electric Corp.

Special Employee Literature—A, Consolidated Edison Co of New York, Inc; B, Utah Power and Light Co; C, Saskatchewan Power Corp.

Window Display—A, Cincinnati Gas & Electric Co; B, Southwestern Public Service Co; C, Pennsylvania Power Co.

Interior Display—A, Cincinnati Gas & Electric Co; B, Central Maine Power Co; C, Washington Water Power Co.

Car, Bus Cards and Truck Posters—A, Union Electric Co of Missouri; B, Toledo Edison Co; C, Portland Gas & Coke Co.

Outdoor Advertising—A, Public Service Co of Northern Illinois; B, Laclede Gas Co; C, Chattanooga Gas Co.

Annual Report to Stockholders—A, Niagara Mohawk Power Corp; B, Connecticut Light & Power Co; C, Minnesota Power & Light Co.

Single Promotional Newspaper Ad—Electric—A, Commonwealth Edison Co; B, Florida Power & Light Co; C, Hawaiian Electric Co, Ltd.

Single Merchandising Newspaper Ad—Electric—A, Commonwealth Edison Co; B, Narragansett Electric Co; C, Malden Electric Co.

In the following three classifications, all companies competed as one group:

Radio Advertising—East Ohio Gas Co.

Motion Picture—Columbia Gas System, Inc.

Television Program—Ohio Fuel Gas Co.

WASHINGTON COMMENT

JESSE MOCK

There is a widespread tendency to discount the part the Federal Power Commission will play in deciding how the Snake River will be developed near the Idaho-Oregon border. True withdrawal of Interior Department as a special pleader for the proposed federally constructed Hells Canyon Project does boost the morale of those favoring development by the Idaho Power Co.

FPC Will Set Terms for Snake River Projects

But this dosen't mean that the federal Hells Canyon proposal has been dropped entirely. It will continue to be before FPC just as much as if all the resources of the huge Interior Department were still behind it. Most assuredly it does not mean that FPC approval of the Idaho Power three-dam development is merely a matter of time. There is one factor that must not be forgotten.

FPC Is Boss of Hydro Resources . . . Under the Federal Power Act, FPC is charged with deciding upon the fullest and most comprehensive development of the nation's hydroelectric resources. Its broad legal authority permits the quasi-judicial agency to accept, reject, or modify any license application which comes before it. Of course, electric companies are not required to accept modifications which the commission may impose. Penalty for such refusal is that the company does not get the license.

Only Congress may exempt waterpower sites on navigable streams from FPC jurisdiction. It has done this in numerous instances by specifically authorizing such sites to be developed by federal agencies. But this is not at issue in the Hells Canyon controversy. Congress has never authorized it for federal construction. On the contrary Congress has twice declined to do so.

FPC has jealously guarded its prerogatives in the waterpower field. Only this year FPC was upheld by the Supreme Court in granting a license to a private company although the former Truman administration, acting through its Interior Department, used every legal device to hold the site for federal development.

One effect of the Republican administration in withdrawing as a partisan of the Hells Canyon Project is to increase the stature of the FPC. The Eisenhower administration is relying much more heavily upon FPC to decide the controversial federal-private power battles than did the Democratic administrations. What the Eisenhower administration is doing is taking a long chance that the FPC decisions will, in the end, also be politically attractive to a majority of the people. The Democrats were never willing to take that chance. That's why they cast Interior in the role of special pleader for what they believed had the most political appeal.

FPC Decisions Important to Republicans . . . With this added stature and added responsibility, FPC may be expected to take itself even more seriously than it has in the past 20 years. Fairness of its decisions becomes doubly important to the Republican administration.

You can expect, then, that the commission will be ultrajudicial in handling the Idaho Power Co application. FPC engineers have been busy for months comparing the federal and company plans for developing the long-disputed site. Their recommendations as to the most feasible plan will probably be ready when the hearings get underway July 7.

At present Idaho Power has an application pending for construction of only the Oxbow Project, although its overall development envisions two other dams and power plants—Brownlee and Hells Canyon. This last project, is, of course, a lower dam than that contemplated in the federal plan.

Some experts are now guessing that FPC may require concurrent construction of all three of these projects as a prerequisite for issuing a license to the company. This would be one comparatively quick way to ease the power supply problems in the Pacific Northwest. A single project, such as Oxbow, would be used mainly to add to the power supply in Idaho alone.

Still another FPC requirement might possibly incline provision for sufficient transmission facilities to get power from the company development into the Northwest Power Pool.

The point is that FPC still must make the decision on the development of the Snake River, and it is not much nearer such a decision than before Interior withdrew as a partisan pleader for federal construction.

TECHNICAL NOTES

ARCHER E. KNOWLTON

Crossarms preservatively treated in 1951 totalled 5,000,000 or 2½ times as many as in 1950; 81% were given pressure treatment.

Aluminum can be electrodeposited from an ether solution of aluminum chloride and a metal hydride.

Close overall system speed control calls for small governing-system dead-band and participation of all machines in speed regulation.

More stable and rapid response is obtainable with tie-line power frequency bias control than with flat tie-line power control in one area and frequency control in the other area.

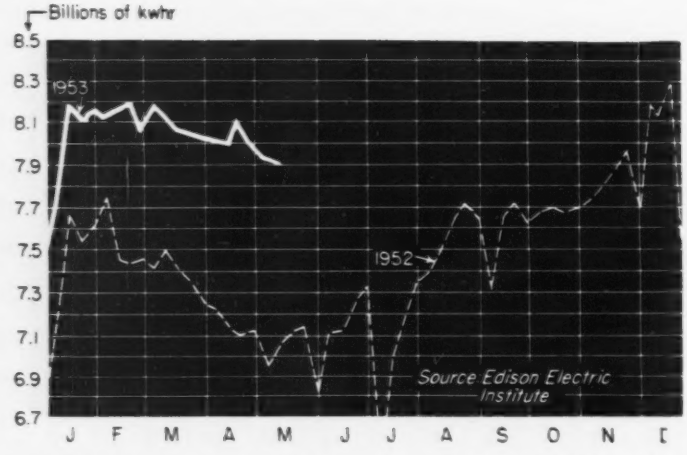
Surplus reactive capability affords about the only margin available to many dispatchers to meet line or generator failures. It should not, therefore, all be used up in normal operation.

Role of the governor as it affects tie-line loadings is appreciated by too few mechanical engineers. Conversely too few electrical engineers appreciate that abrupt changes in load lower the efficiency of boiler operation.

Pipe of fiber-glass cloth bonded with synthetic resin has stood up in Navy minesweepers where metallic piping failed due to corrosion, shock, and vibration. It costs much less than copper-nickel or stainless steel and can be patched with fiber-glass tape.

Light output is increased by 40% when fluorescent lamps are operated on 360 cycles rather than 60. A magnetic converter steps up the frequency.

STATISTICS



Output Week Ended May 9—7,896,539,000 Kwhr

Per Cent Change From Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
May 9	+12.2	+13.3	+10.4	+13.8	+12.4	+16.5	+4.7	+12.5	+9.0	+10.3
May 2	+14.2	+13.9	+9.3	+19.1	+14.1	+16.6	+9.7	+16.8	+10.7	+12.2
April 25	+12.3	+11.1	+8.6	+13.1	+11.7	+16.1	+7.4	+15.1	+11.4	+15.2

Electric Power Statistics

		Latest Month	Preceding Month	Year Ago
Peak Load (Million Kw)	Mar.	73.5	73.3	67.1
Capacity (Million Kw)	Mar.	83.17	82.83	76.34
Production (Billion Kwhr)	Mar.	36.97	33.60	33.04
Hydro		10.20	8.99	10.44
Fuel		26.77	24.60	22.60
Fuel Consumption				
Coal (Million Tons)	Mar.	9.44	9.16	8.84
Oil (Million Barrels)		8.08	6.81	5.22
Gas (Billion Cu Ft)		70.16	57.82	57.39
Sales (Billion Kwhr)	Feb.	31.21	32.07	29.08
Residential		9.31	9.82	8.51
Commercial		5.17	5.37	4.87
Industrial		14.76	14.90	13.82
Other		1.96	1.97	1.88
Net Income Class A & B Companies ($ Million)	Feb.	98.39	98.55	88.41
Estimated Dec. '53 Peak (Million Kw)	Feb.	86.5	87.0	89.1
Kwhr per Residential Customer (12 Month Average)	Jan.	2,183	2,169	2,021
Revenue per Kwhr Residential Service (12 Month Average)	Jan.	2.77¢	2.77¢	2.81¢
Canadian Production (Billion Kwhr)	Mar.	5.78	5.26	5.22

Business Statistics

FRB Industrial Production Index†††	Mar.	239*	236	217
Gross National Product Annual Rate ($ Billion)	4th Qtr.	355.2*	343.0	337.1
E. W. 5 Industry Production Index	Mar.	129.8*	129.0**	123.8
ENR Construction Cost Index††	Apr.	123.6	123.2	116.2
BLS Consumer Price Index	Mar.	188.8	188.6	188.0
NEMA Insulation Materials Sales Index†	Mar.	694	649	536
NEMA Electric Appliance Sales Index†		356	306	278
NEMA Household Refrig. Sales Index†		211	208	163
Metal Prices (May 6)				
Copper, Conn. V., lb		$ .30	$ .30	$ .24
Lead, N. Y., lb		.12½	.13½	.17
Zinc, prime Western E. St. Louis, lb		.11	.11	.19½
Tin, Straits, qual. N. Y. lb		1.00	1.16½	1.21½
Aluminum, ingot, base price		.20½	.20½	.19
Nickel, base price		.60	.60	.56½
Steel, billets, Pitts., ton		59.00	59.00	56.00
Steel, scrap, No. 1 heavy, Pitts., ton		45.00	45.00	45.00

* Preliminary ** Revised † 1936=100 †† 1949=100 ††† Unadjusted

Half of U. S. Families Worth Over $7,500

Half of the families in the United States now have a net worth of $7,500 or more according to a report issued by the National Industrial Conference Board. A sixth of all families own more than $30,000 in net assets. Fewer than a tenth of all families have more debts than assets. The four-fifths of all families who earn under $5,000 a year own nearly half the nation's wealth, according to the NICB report.

Consumer wealth has risen above three-quarters of a trillion dollars; an increase of over 50% since World War II. Consumers' asset holdings (cash, insurance, homes, business interests, etc) are now in excess of $800 billion, with offsetting debts about $100 billion. The postwar rise in asset values, however, reflects rising prices as well as a growth in real wealth.

NICB found that of the more than $800 billion of consumer assets, 29% is in liquid form (cash and securities) and another 6% in insurance equities. The rest is in "fixed" assets—roughly half in personal assets, and half in business investments. Owned homes have a market value in excess of $200 billion. Homeowners' actual equities (after subtracting mortgages) amount to about $150 billion. Family automobiles are valued at about $40 billion, or at $35 billion after instalment debts against the vehicles are subtracted. Television and radio sets, refrigerators, freezers and the like add another $15 billion (before debts), according to the report.

Homes and the Family Savings . . . Over half of all families in the United States own their own homes, according to the Board, the proportion varying from about half in the middle-income brackets to about three-fourths for families with incomes in excess of $7,500.

The Board notes that about 70% of all U. S. families own bank accounts or cash equivalents, such as savings or other government bonds. Insurance ownership, the most widely held of investment assets, is reported by three-fourths of all families—ranging from about half of all low-income families to well over nine-tenths of upper-income groups.

Bond Prices Sink to New Post-War Lows

Third quality bond yields showed the largest increase going from 3.14% to 3.39%

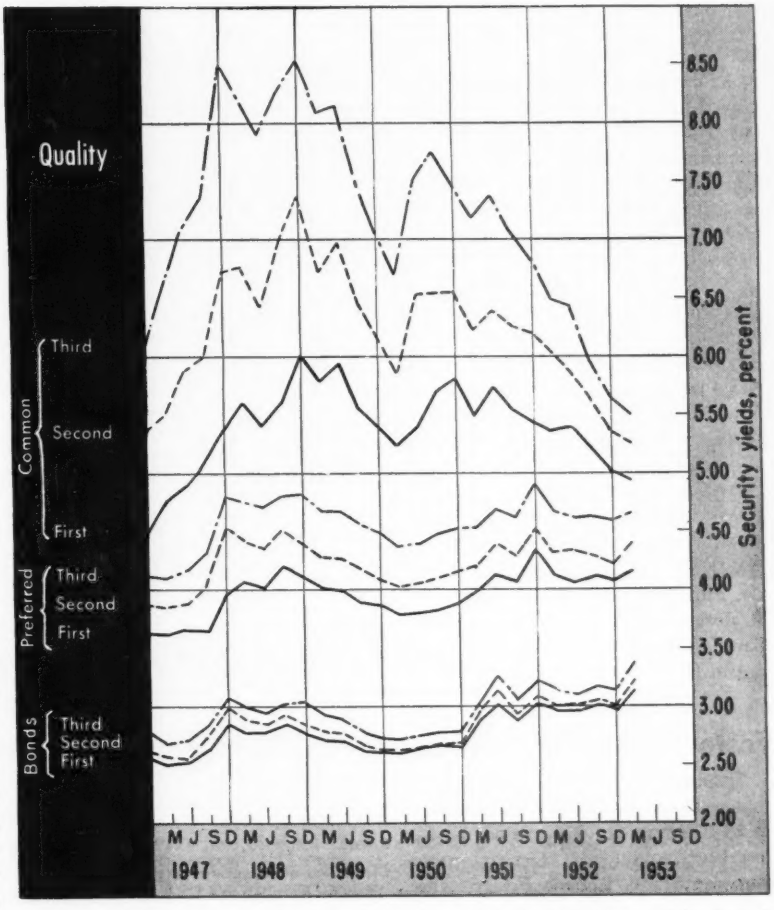
Electric utility bond prices sank to new post-war lows in the first quarter of 1953. This caused a definite uptrend in the yields as shown in the chart on the right. In fact the yield of 3.15% on the first quality bonds exceeded the third quality yield of 3.14% shown for the fourth quarter of 1952. Conditions in the short term market remained tight in contrast to usual seasonal trends.

FRB Withdraws Support . . . Since March 1951, the Federal Reserve Board has not supported pivotal Treasury issues and bond prices more truly reflect the law of supply and demand. As time passed, it became apparent that the demand for long term capital from both private and public borrowers would exceed the supply of funds and as a result interest rates would be forced higher. With this in prospect, institutional buyers held back.

The experience of Consolidated Edison Co's first mortgage 30-year bond offerings, rated Aa by Moody's mirrors the changes in the long-term debt market. In February 1951 the public accepted a 2.90% yield from this company. In May 1951, after the March Treasury-Federal Reserve "accord," the yield went to 3.10%. In March 1952 it was 3.25% while in February 1953 it reached 3.38%, highest level since the late thirties.

Security Sales Hold . . . Securities offered to the public by the electric companies during the first quarter of 1953 equalled in amount last year's first quarter totals as shown in the tabulation below. Including private sales, which probably came close to $125 million, total funds from outside sources exceeded the volume last year. Private sales include the amount "taken-down" by the company, not in every case the total commitment.

Debt securities totaling $202 million were about two-thirds the amount offered publicly during the first quarter of 1952, but direct bond sales negotiated in late 1952 or early 1953 amounted to well over $100 million.



SECURITY YIELDS for the first quarter of 1953 were mixed. All qualities of bonds and preferred stock yields showed definite uptrends while common stock yields were on the decline

Preferred Sales Higher . . . Preferred stock sales amounted to $71 million, up $10 million over last year's quarter. Most of the offerings came during a three weeks' period beginning the middle of January and at offering price yields which ranged from 4.27% to 4.60%. During March three companies selling preferred stock fared well and offering yields ranged from 4.60% to 5.00%. Private placements of preferred stocks totaled $18 million, a figure higher than such sales for new money during all of 1952.

Public Offerings—Electric Utility Securities
(Thousands of Dollars)

	First Quarter of 1953			First Quarter of 1952		
	New Money	Other	Total	New Money	Other	Total
Bonds, Notes and Debentures	199,800	2,000	201,800	295,800	.....	295,800
Preferred Stocks	70,717	.....	70,717	60,983	.....	60,983
Common Stocks	166,019	.....	166,019	80,347	5,601	85,948
Total	**436,536**	**2,000**	**438,536**	**437,130**	**5,601**	**442,731**

The Dow-Jones utility stock averages continued to climb and on March 13 reached 53.88, the highest point since 1931. Electric utilities were prepared to take advantage of investors' continuing interest in equity issues and common stock sales during the first quarter of 1953 were more than double the amount sold during the first quarter of 1952.

An examination of the methods employed in selling common stock totaling $166 million reveals that seven companies sold shares worth $91 million directly to underwriters, while 12 gave stockholders first chance to subscribe for common shares amount to $75 million.

Dividends Upped . . . Fourteen companies increased their dividends during the first quarter of 1953 as compared with ten last year. These were: Arizona Public Service Co, Central Illinois Electric & Gas Co, Citizens Utilities Co, Colorado Central Power Co, Consolidated Edison Co, Idaho Power Co, Middle South Utilities, Missouri Public Service Co, Montana Power Co, Oklahoma Gas & Electric Co, Puget Sound Power & Light Co, St. Joseph Light & Power Co, South Carolina Electric & Gas Co, and Wisconsin Hydro-Electric Co.

Foster Associates Set Up

Formation of Foster Associates, management consultants, with offices at 88 Chestnut St., Ridgewood, N. J., has been announced. General partners are Dr J. Rhoads Foster, who will serve as managing partner; Dr Henry Herz, Dr Hans E. Nissel; Dr William L. Grossman; and Leslie H. Newman, who will serve as inside partner. The firm will offer advisory services to public utility companies with respect to their managerial and regulatory problems.

Niagara Mohawk to Call Rest of Class A Stock

Niagara Mohawk Power Corp has called all the outstanding Class A stock of the corporation, Pres Earle J. Machold has announced.

He said that on and after June 30, Class A stockholders will be entitled to receive the redemption price of $26.875 per share, and no further dividends will accrue or be payable

(*Continued on page* 280)

Today in Utility Finance

YIELDS (%)

Quality	Bonds 1st	Bonds 2nd	Bonds 3rd	Preferred Stocks 1st	Preferred Stocks 2nd	Preferred Stocks 3rd	Common Stocks 1st	Common Stocks 2nd	Common Stocks 3rd
DATE									
1953									
May 7	**3.36**	**3.45**	**3.69**	**4.34**	**4.56**	**4.77**	**5.13**	**5.56**	**5.87**
April 30	3.34	3.44	3.62	4.32	4.51	4.76	5.14	5.60	5.77
END OF QTR.									
1st 1953	3.15	3.23	3.39	4.16	4.41	4.66	4.95	5.24	5.50
4th 1952	2.99	3.03	3.14	4.06	4.22	4.59	4.98	5.33	5.62
3rd 1952	2.99	3.03	3.16	4.10	4.26	4.61	5.18	5.59	5.96
2nd 1952	2.95	3.00	3.09	4.05	4.31	4.60	5.38	5.85	6.42

Data: Reis & Chandler, Inc.

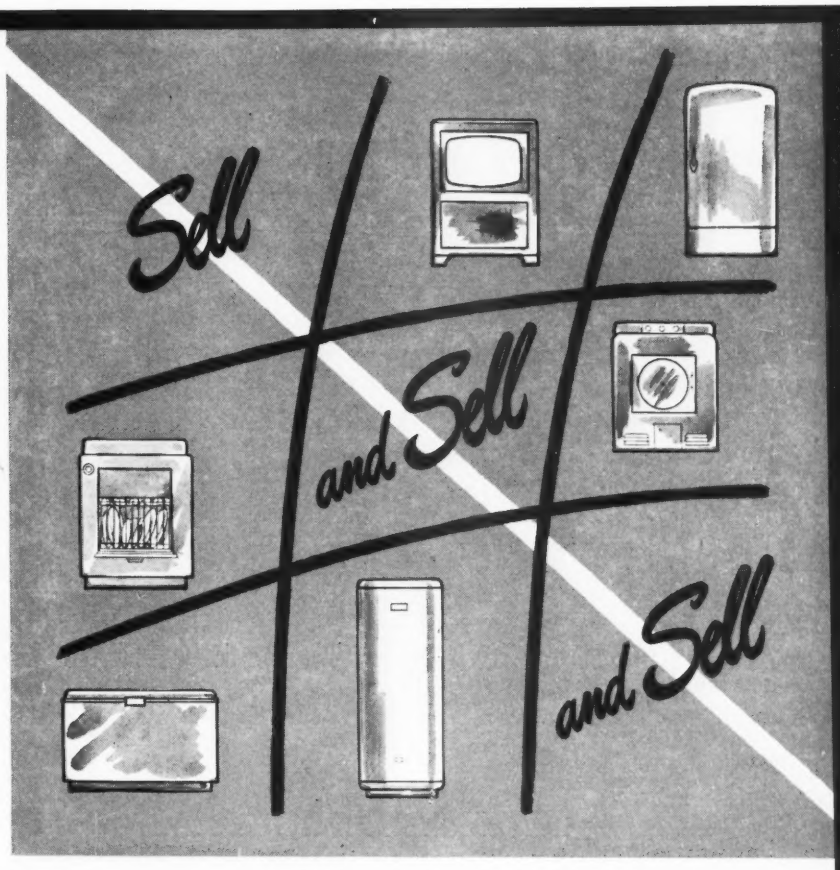
EARNINGS

Company	Period Months	Ended	Net Income 1953	Net Income 1952	Earnings Per Common Share 1953	Earnings Per Common Share 1952
California-Pacific Utilities	12	Mar.	$544,659	$497,238	$2.04	$1.85
Commonwealth Edison	12	Mar.	34,660,667	28,664,949	2.29	2.03
Community Public Service	12	Mar.	1,223,492	970,896	....	....
Delaware Power & Light	12	Mar.	3,789,652	3,248,745	1.84	1.64
Duquesne Light	12	Mar.	14,705,329	13,256,069	2.20	2.07
El Paso Electric	12	Mar.	1,556,406	1,491,224	1.95	1.86
Idaho Power	12	Mar.	3,935,692	3,500,240	2.86	2.60
Interstate Power	12	Mar.	2,400,852	2,022,889	.89(a)	.86(a)
Iowa-Illinois Gas & Electric	12	Mar.	4,531,081	4,103,965	2.36	2.15
Northwestern Public Service	12	Mar.	937,669	875,409	....	....
Public Service of New Mexico	12	Mar.	1,151,187	1,037,008	0.83(b)	0.86(b)
Western Light & Telephone	12	Mar.	1,037,827	912,494	2.14(c)	2.18(c)
Wisconsin Public Service	12	Mar.	3,875,000	3,476,000	....	....
			1952	**1951**	**1952**	**1951**
Arkansas-Missouri Power	12	Dec.	$820,991	$576,002	$1.89(e)	$1.35(e)
Kansas Gas & Electric	12	Dec.	3,326,994	2,760,868	2.84(f)	2.84(f)
Mountain States Power	12	Dec.	1,605,228	1,397,026	1.14	1.16
Pacific Power & Light	12	Dec.	4,413,703	3,596,321	1.80(g)	1.57(g)
Wisconsin Power & Light	12	Dec.	4,457,717	3,644,516	1.63	1.49

Notes—Figures shown for the last five companies have been audited. (a) Based on total shares outstanding at end of period; (b) Based on 1,385,092 shares in 1953 and 1,211,956 shares in 1952; (c) Based on 391,009 shares in 1953 and 325,841 shares in 1952; (e) Based on 379,302 shares in 1952 and 360,350 shares in 1951; (f) Based on 975,000 shares in 1952 and 775,000 shares in 1951; and (g) Based on 2,200,000 shares in 1952 and 2 million shares in 1951.

FINANCING

Company and Description	Amount of Offering (000)	Offering Price	Yield to Public
WEEK OF MAY 7-13			
Bonds			
New Orleans Public Service—1st mtg 4¼% due 1983	$6,000	103.00%	3.95%
Central Power & Light—1st mtg 4¼% due 1983	8,000	102.88	3.96
Alabama Power—1st mtg 4⅛% due 1983	18,000	102.172	4.00
Preferred Stock			
Texas Power & Light—70,000 sh $4.84 no par	$7,000	$99.79	4.85%
Philadelphia Electric—150,000 sh 4.68% cum $100 par	15,000	101.75	4.60
SCHEDULE FOR MAY—JUNE			**Bid Date**
Bonds			
Texas Power & Light—1st mtg due 1983	$5,000	.....	May 18
Metropolitan Edison—1st mtg due 1983	8,000	.....	May 18
Pacific Gas & Electric—1st mtg due 1984	65,000	.....	May 19
Philadelphia Electric—1st mtg due 1983	30,000	.....	May 20
Potomac Electric Power—1st mtg due 1988	10,000	.....	May 25
Iowa Public Service—1st mtg due 1983	7,500	.....	June 2
Arkansas Power & Light—1st mtg	18,000	.....	June 8
Gulf Power—1st mtg due 1983	7,000	.....	June 9
Los Angeles, Calif., Department of W&P—revenue	5,000	.....	June 9
New Jersey Power & Light—1st mtg due 1983	5,500	.....	June 9
Pennsylvania Electric—1st mtg due 1983	12,500	.....	June 23
Public Service Electric & Gas—1st mtg due 1983	50,000	.....	.....
Consolidated Gas, EL&P of Baltimore—1st mtg	25,000	.....	.....
Preferred Stock			
Public Service Co of Indiana—600,000 sh $25 par	$15,000	.....	.....
Common Stock			
Potomac Electric Power—852,840 sh (to be offered common-holders on 1-for-5 basis, record about May 27 to expire June 10)	.....	.....	.....
Rochester Gas & Electric—175,000 sh (to be offered common-holders on 1-for-7 basis record about May 28 to expire about June 12)	.....	.....	.....
Texas Utilities—350,000 sh	.....	.....	June 2
American Gas & Electric—800,000 sh	.....	.....	June 9
New England Electric System—828,516 sh (to be offered common-holders on 1-for-10 basis, record June 11 to expire June 25; company will name subscription price on June 8 and open bids June 10 for underwriting fee)	.....	.....	June 10
General Public Utilities—568,665 sh (to be offered common-holders on 1-for-15 basis, record June 2 to expire June 24 with oversubscription privileges)	.....	.....	.....
Public Service of Indiana—472,000 sh (to be offered common-holders on 1-for-8 basis)	.....	.....	.....



Survey indicates large volume of appliance sales anticipated by manufacturers. Emphasis on need for more knowledge of local characteristics of appliance loads thus is emphasized

Load Research Essential Today for Tomorrow's Appliance Sales

Working together in the promotion and sale of home uses of electricity, manufacturers and utilities can look forward to bright years ahead. This cheerful thought derives from a survey of appliance makers reported in the following pages.

Taking the retail prices of their products in 1952 as the base, appliance manufacturers can figure on a market averaging $7¼ billion through the years 1953-1960 if their sales come up to the averages of their estimates.

That volume of appliance sales, if attained, will raise the average annual residential usage of electricity from 2,175 kwhr in 1952 to 3,842 in 1960, a gain of 1,667 kwhr in 8 years. It is not likely that the average revenue per kwhr will markedly decrease in those years and, on that assumption, the rise in usage, plus growth in number of customers, will result in practically doubling residential revenue in 1960 over that in 1952.

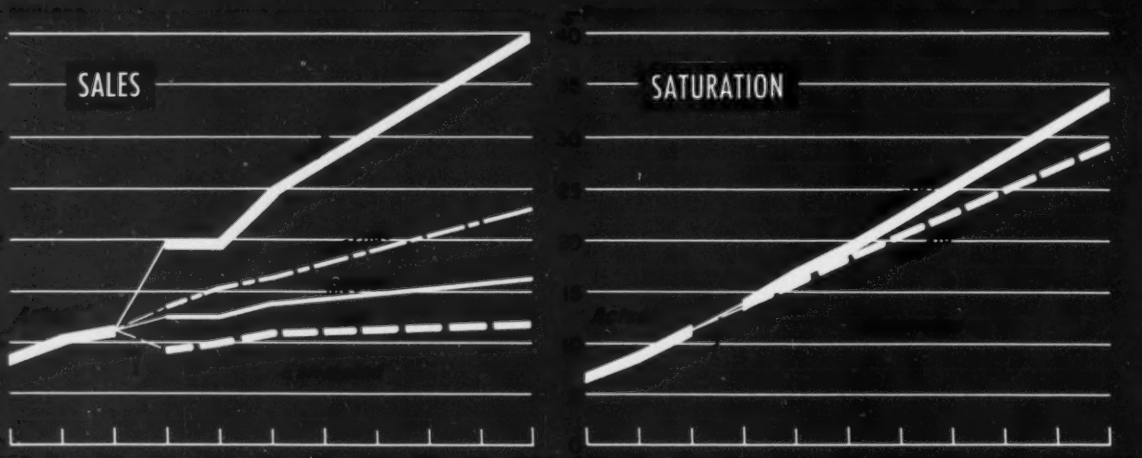
But this is not something that just is going to happen. The appliance manufacturers will have to put a lot of steam into their selling in order to reach a level of $7¼ billion annually over the 8-year period. That figure is about 22% above their sales in 1952 and will have to be worked for. So also will the utilities have to work for the possible doubling of their residential revenue in 8 years.

To be most productive of net earnings, utility sales work must be directed towards definite objectives. And the objectives can be determined only from knowledge of the characteristics of loads on the utility system. That knowledge should be local in nature and should be current, because the characteristics of the same load may vary considerably with place and time. For this reason there is presented, on pages following the detailed report of the appliance sales survey, a series of articles emphasizing the necessity for, and giving examples of, local load research.

Appliance manufacturers were asked to estimate industry sales—not their own sales—for the years 1953, 1954, 1955 and 1960 of 12 appliances that constitute the major volume of the business.

Additional to the appliance survey, inquiry was made of makers and suppliers of electric house heating equipment—heat pumps and resistance heaters—to ascertain as well as might be what would be the effect of this new development in the coming years. The evidence here is conclusive in only one respect. It is that electric house heating will increase very slowly indeed in relation to the number of electric utility customers, but also fast enough to keep the makers and sellers of equipment very happy. The estimates indicate that by 1960 probably less than 2% of the country's homes will be electrically heated. But that less than 2% means thousands of heat pumps and millions of resistance heating units sold.

HOME FOOD FREEZERS



Appliance Makers Are Confident of

Top estimates for 1960—3.6 million clothes washers—1.4 million ranges—1.1 million room air conditioners . . .

Home Food Freezers (Data, this page)

One is tempted to say that optimism runs rampant in the sales estimates received from 18 suppliers of home food freezers. Only one exhibits pessimism with an estimate for 1953 lower than the actual sale in 1952, while another sees a slight drop-off in 1955.

High and low estimates are in millions: 2.0 and 0.956 for 1953; 2.0 and 1.0 for 1954; 2.5 and 1.1 for 1955; 4.0 and 1.2 for 1960. Average and median estimates (millions) are quite widely separated: 1.367 and 1.275 for 1953; 1.532 and 1.275 for 1954; 1.624 and 1.39 for 1955; 2.303 and 1.625 for 1960.

Starting from a saturation of 11.5% in 1952, calculation on average estimates indicates 34.5% in 1960. On the basis of medians, the 1960 saturation figures out to 29.6%.

On the basis of average retail value of $370 per unit in 1952, the money volume of the home freezer market 1953 through 1960 amounts to $5,430,860,000.

Room Air Conditioners (Data, page opposite)

More estimates of sales of room air conditioners were received than of any other appliance. Around 80 companies now have this appliance on the market although there are probably not more than 20 actual manufacturers.

The averages of estimates indicate a market of over a million units in 1960. Weight is given to the averages by their consistent close approximation with the median estimates. Averages and medians (millions) are, respectively: In 1953—0.482 and 0.475; in 1954—0.592 and 0.6; in 1955—0.716 and 0.7; in 1960—1.112 and 1.1.

Estimate of sales in 1953 are remarkably close together; 19 of the 23 are within 100,000 of the average and median figures. For 1954, 16 of 20 come within that range; but for 1955 the estimates diverge considerably, only 8 of 20 falling in the 100,000 range of difference. Looking ahead to 1960 the divergence would be expected to be greater, and it is, 5 of 19 in this range.

The differences between high and low estimates, as also to be expected, become greater as estimates are projected farther into the future—0.325 million vs 0.7 million in 1953; 0.37 vs 1.0 million in 1954; 0.4 vs 1.5 million in 1955; 0.5 vs 1.75 million in 1960.

If actual sales in the years ahead follow the averages of estimates, the room air conditioner is calculated to reach a user saturation of 10.6% in 1960 as against 1.3% in 1952.

On the basis of average retail value of $360 per unit in 1952, the money volume of the room air conditioner market 1953 through 1960 amounts to $2,361,600,000.

Electric Clothes Dryers (Data, page 144)

Estimates of sales of electric clothes dryers vary from 0.477 million to 0.8 for 1953; for 1954, from 0.51 to 1.0; for 1955, from 0.55 to 1.4; for 1960, from 0.6 to 3.0. Despite these comparatively wide ranges in the estimates received from 16 companies, the average and median estimates are remarkably close together—0.615 million and 0.58 for 1953; 0.713 and 0.7 for 1954; 0.823 and 0.8 for 1955; 1.315 and 1.3 for 1960.

The average and median estimates continue the trend of

Home Food Freezers—
Estimates of Unit Sales (1,000)
(1952 Sales—140,000)

	1953	1954	1955	1960
1	2,000	.....	.....	.....
2	2,000	2,000	2,000	4,000
3	1,850	1,400	.....	.....
4	1,500	2,000	2,500	4,000
5	1,500	2,000	2,500	4,000
6	1,300	1,500	1,800	2,500
7	1,300	1,200	1,100	1,600
8	1,300	1,500	1,800	2,500
9	1,300	1,500	1,750	2,500
10	1,250	1,250	1,250	1,500
11	1,250	1,500	2,000	2,000
12	1,250	1,300	1,400	1,600
13	1,200	1,000	1,600	1,800
14	1,200	1,100	1,200	1,500
15	1,200	1,200	1,250	1,500
16	1,150	1,200	1,350	1,650
17	1,200	1,100	1,200	1,500
18	956	1,148	1,381	1,200
Averages	**1,367**	**1,532**	**1,624**	**2,303**
Medians	**1,275**	**1,275**	**1,390**	**1,625**

Future Markets

increase set by actual sales in 1950, 0.251 million; in 1951, 0.354; in 1952, 0.44. Only one maker estimates a really spectacular increase in sales in the years ahead; he starts with 0.8 million for 1953, goes to 1.0 for 1954, then to 1.4 for 1955, and ends up with 3.0 for 1960. This high series of estimates is rather suspect, however, because it may include gas-heated units, although the request for estimates was intended to cover only electric dryers.

The 1952 saturation of the electric dryer was 2.7%. Projecting on the basis of average estimates runs the saturation up to 14.8% in 1960.

On the basis of average retail value of $245 per unit in 1952, the money volume of the electric clothes dryer market 1953 through 1960 amounts to $1,897,035,000.

Electric Ranges (Data, page 144)

Except for one maker who sees range sales plodding along at a million units per year apparently indefinitely, the 16 estimates received are all reasonably optimistic, some more than others. The high estimate, in millions, for 1953 is 1.7; for 1954, also 1.7; for 1955, 1.8; for 1960, 2.8. The low estimate for each year is 1.0, representing the million mentioned above.

The average and median estimates (millions) for 1953 are 1.276 and 1.2; for 1954, 1.307 and 1.3; for 1955, 1.393 and 1.35; for 1960, 1.885 and 1.85. These figures compare with actual sales in millions of 1.83 in 1950, 1.4 in 1951, and 1.06 in 1952.

Since more than one range is not usually found in one wired home the saturation ratio of this appliance can be calculated pretty accurately. The figure for 1952 is 24.1%. If sales follow the average estimates, the 1960 saturation will be 36.3%.

Room Air Conditioners—
Estimates of Unit Sales (1,000)
(1952 Sales—341,000

	1953	1954	1955	1960
1	700	.....	.....	.....
2	650	1,000	1,500	1,750
3	590	805	1,045	.....
4	550	650	750	1,200
5	525	600	700	1,200
6	500	650	850	1,500
7	500	450	550	750
8	500	600	700	950
9	500	600	600	1,000
10	500	700	900	1,500
11	475	650	900	1,750
12	475	594	713	.....
13	475	600	725	1,500
14	475	550	600	1,000
15	450	500	500	500
16	450	600	700	1,200
17	450	550	656	750
18	400	.....	.....	.....
19	400	400	400	600
20	400	475	530	920
21	400	.....	.....	.....
22	400	500	500	750
23	325	370	500	1,200
Averages	**482**	**592**	**716**	**1,112**
Medians	**475**	**600**	**700**	**1,100**

On the basis of average retail value of $255 per unit in 1952, the money volume of the range market 1953 through 1960 amounts to $3.165,315,000.

Electric Refrigerators (Data, page 147)

Of all markets for electrical appliances, that for the refrigerator probably comes closest to stability. With a 1952 saturation of 89.2% replacement becomes a large factor in sales. This condition is quite definitely reflected in the estimates received from 12 manufacturers.

Sales in 1953 lower than in 1952 are anticipated by 5 of the 12, with 3 others seeing them only slightly above those of 1952.

For 1953 the high and low estimates, in millions, are 4.2 and 3.45; for 1954, 4.1 and 3.0; for 1955, 4.0 and 2.75; for 1960, 4.5 and 3.0.

The average and median estimates (millions) for 1953 are 3.666 and 3.6; for 1954, 3.608 and 3.6; for 1955 3.513 and 3.65; for 1960, 4.25 and 4.35.

Considering that the number of wired homes is estimated to rise from 42.3 million in 1952 to 52.1 million in 1960, the increase in average estimated sales of only about 0.6 million from 1953 to 1960 argues anticipation of a very large replacement market.

This condition entered strongly into calculation of the 97% saturation in 1960, based on average estimates.

On the basis of average retail value of $285 per unit in 1952, the money volume of the refrigerator market 1953 through 1960 amounts to $8,709,600,000.

Dishwashers (Data, page 147)

For the immediate years ahead, through 1955, estimates of dishwasher sales from six makers are reasonably close together. For 1953 the high and low estimates in millions are 0.3 and 0.24; for 1954, 0.375 and 0.28; for 1955, 0.45 and 0.27. But for 1960, the spread is from a million down to 0.35 million.

Average and median estimates are very close (millions) —0.273 and 0.275 for 1953; 0.321 and 0.3 for 1954; 0.35 and 0.35 for 1955; 0.69 and 0.6 for 1960.

A small drop in sales in 1955 appears in the estimates of two makers, down from 0.3 to 0.28 million in one case and from 0.28 to 0.27 in the other. Only one maker shows outstanding optimism in his estimates, going to a million in 1960 as against 0.6 million for the next highest.

Sale of this appliance amounted to 0.21 million in 1952. All estimates indicate healthy increases over this figure in the coming years.

The 1952 saturation of the dishwasher was 3%. On the basis of averages of estimated sales, saturation in 1960 will be 8.6%.

On the basis of average retail value of $300 per unit in 1952, the money volume of the dishwasher market 1953 through 1960 amounts to $1,144,200,000.

Television Receivers (Data, page 146)

Consensus, based on averages of estimates received from 10 makers, is that annual sales of television receivers will remain at a fairly constant level through 1960. The median estimates indicate a gradual increase in sales.

All estimates are of a rise in sales in 1954 over 1953, with a decline shown by 5 of the 12 in 1954. For 1955, a drop from 1954 is shown by 3 of the estimates, but only one shows a lower figure for 1960 than for 1955.

High and low estimates (millions) for 1953 are 8.0 and 6.0; for 1954, 8.8 and 5.0; for 1955, 7.0 and 4.0; for 1960, 10.0 and 5.6. Averages and medians for 1953 are 6.975 and 6.95; for 1954, 6.76 and 6.75; for 1955, 6.344 and 7.0; for 1960, 6.678 and 8.0.

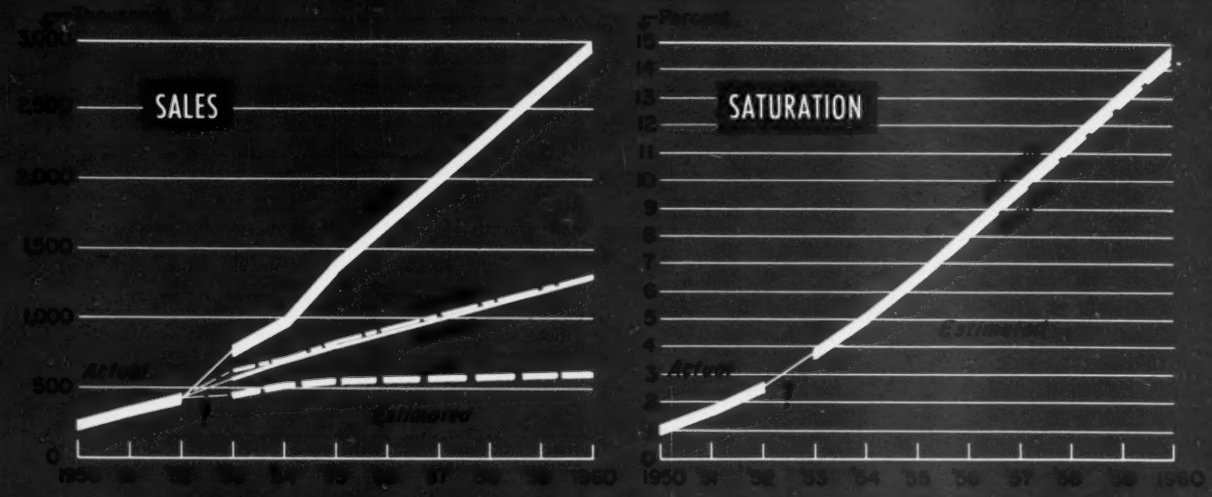
Replacement will probably be a large factor in the television market in the next few years. Millions of small-screen receivers sold in earlier years will be displaced by

Electric Clothes Dryers—
Estimates of Unit Sales (1,000)
(1952 Sales—440,000)

	1953	1954	1955	1960
1	800	900	1,100	1,300
2	800	800	900	1,000
3	800	1,000	1,400	3,000
4	750	750	750	1,000
5	650	750	850	1,500
6	600	575	550	1,500
7	600	750	850	1,200
8	600	750	800	800
9	560	700	900	1,350
10	550	650	780	1,470
11	550	600	700	1,000
12	530	640	770	1,200
13	528	.....	.....	.....
14	525	700	800	1,300
15	520	620	640	1,500
16	477	510	550	600
Averages	**615**	**713**	**823**	**1,315**
Medians	**580**	**700**	**800**	**1,300**

Electric Ranges—
Estimates of Unit Sales
(1952 Sales—1,060,000)

	1953	1954	1955	1960
1	1,700	1,400	1,500	1,800
2	1,600	1,400	1,700	1,900
3	1,400	1,300	1,250	2,800
4	1,400	1,700	1,800	2,500
5	1,400	1,500	1,600	2,100
6	1,300	1,300	1,400	1,700
7	1,300	1,400	1,500	1,700
8	1,200	1,400	1,600	2,200
9	1,200	1,300	1,300	2,700
10	1,200	1,350	1,450	1,900
11	1,190	1,100	1,150	1,450
12	1,150	1,220	1,225	1,500
13	1,150	1,150	1,250	1,400
14	1,125	1,190	1,260	1,500
15	1,100	1,200	1,300	2,000
16	1,000	1,000	1,000	1,000
Averages	**1,200**	**1,307**	**1,393**	**1,885**
Medians	**1,450**	**1,300**	**1,350**	**1,850**



ELECTRIC CLOTHES DRYERS

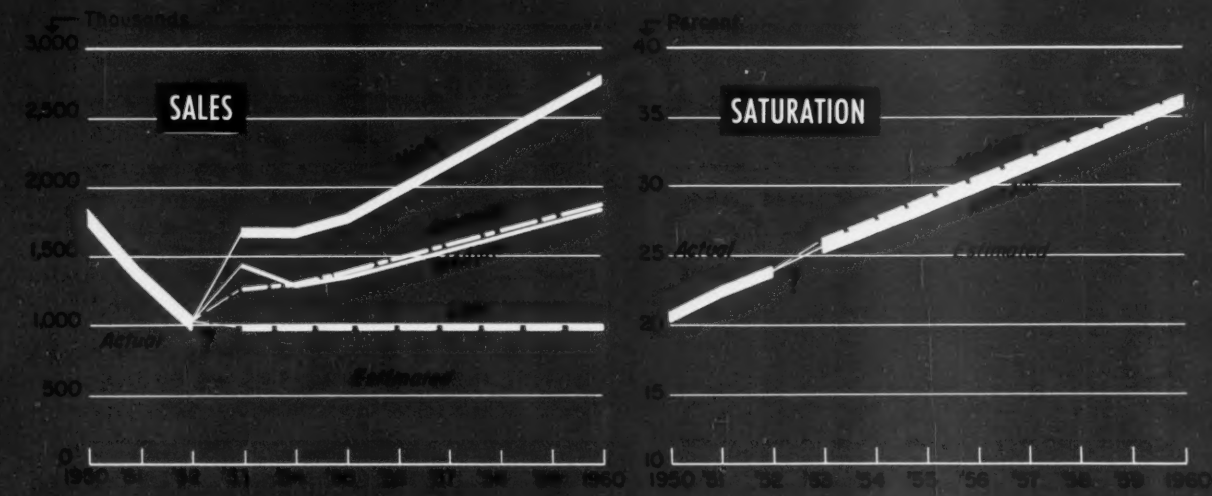
those with larger screens and greater refinement available later. This strong probability entered into calculation of saturation ratios, scaling down considerably the resultant figures of receivers in use. At that, however, the ratios of saturation for 1960 came out to 100.4% on the averages of estimates of sales and to 111.3% on the medians.

These supersaturations would say that by 1960 television coverage would include all wired homes in the country or that many homes in the areas covered would have more than one receiver.

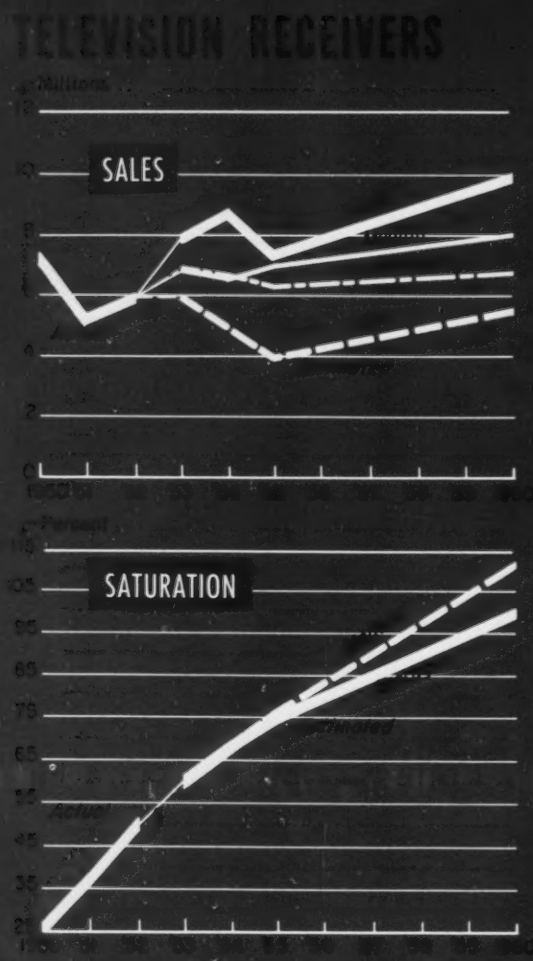
On the basis of average retail value of $282 per unit in 1952, the money volume of the television market 1953 through 1960 amounts to $14,888,190,000.

Electric Water Heaters (Data, page 148)

Of 21 estimates of sales of electric water heaters, 15 are higher than actual sales in 1952. Drop in sales for 1954 from 1953 is shown by 5 estimates and 5 show drops in 1955 from 1954. But the consensus disclosed by the



ELECTRIC RANGES



Television Receivers—
Estimates of Unit Sales (1,000)

(1952 Sales—6,000,000)

	1953	1954	1955	1960
1	8,000	7,000	7,000	10,000
2	8,000	6,500	.....	.....
3	7,500	6,500	4,000	8,000
4	7,500	7,000	6,000	6,000
5	7,000	7,000	7,000	8,000
6	6,900	8,800	7,200	5,600
7	6,400	5,000	5,000	7,000
8	6,250	6,300	6,400	7,000
9	6,200	6,500	7,000	9,000
10	6,000	7,000	7,500	8,500
Averages	**6,975**	**6,760**	**6,344**	**6,678**
Medians	**6,950**	**6,750**	**7,000**	**8,000**

averages indicates a steady increase through 1960.

For 1953, the high and low estimates (millions) are 1.173 and 0.65; for 1954, 1.23 and 0.6; for 1955, 1.4 and 0.65; for 1960, 2.0 and 0.6. Average and median estimates in millions for 1953 are 0.809 and 0.8; for 1954, 0.851 and 0.828; for 1955, 0.872 and 0.82; for 1960, 1.227 and 1.15.

Saturation in 1952 was 13.8%. Calculation from the averages brings saturation up to 21.7% in 1960.

On the basis of average retail value per unit of $132 in 1952, the money volume of the electric water heater market 1953 through 1960 amounts to $1,050,324,000.

Space Heaters

Request for estimates of sales of electric space heaters was not intended to cover those used for complete home heating. This probably was not stated clearly enough in the request and as result several estimates had to be discarded, leaving only two, as follows (1,000):

	1953	1954	1955	1960
	1,200	900	750	600
	1,500	1,750	1,900	2,500
Aver.	1,350	1,325	1,325	1,500

These compare with actual unit sales of 930,000 in 1951 and 1,202,000 in 1952. One maker seems to feel rather bearish about the future market for this appliance while the other appears reasonably optimistic.

A saturation of 40.3% is indicated for this appliance in 1960, calculating from the averages of sales estimates. This compares with 22.9% in 1952. This increase in user saturation seems quite rapid for an 8-year period.

On the basis of average retail value of $25.95 per unit in 1952, the money volume of the space heater market 1953 through 1960 amounts to $254,461,900.

Electric Bed Coverings

The future market for electric bed coverings is apparently one that baffles the forward lookers, for only two estimates of sales were received. They are (1,000):

	1953	1954	1955	1960
	900	1,000	1,020	2,200
	1,000	1,000	1,000	1,250
Aver.	950	1,000	1,010	1,725

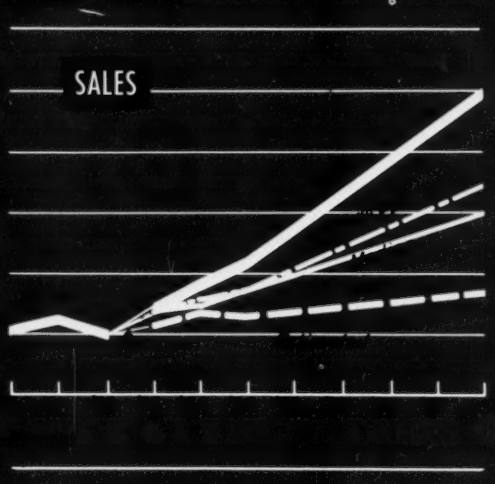
Although the averages of these estimates are not far out of the general projection line of sales in previous years—776,000 in 1951 and 830,000 in 1952—they do not reflect great faith in the future of what many feel is a promising appliance. Projecting on the basis of the averages of estimates results in a saturation of 26.4% in 1960 for this appliance as against 8.6% in 1952.

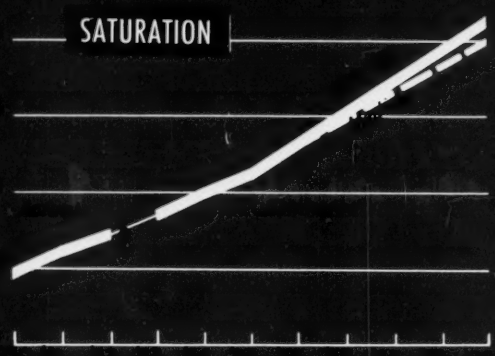
On the basis of average retail value of $43.70 per unit in 1952, the money volume of the bed covering market 1953 through 1960 amounts to $443,773,500.

Clothes Washers (Data, page 150)

Apparently the market for clothes washers is regarded as having reached a volume whose only factor of increase is rise in population.

Previous statistics on washer sales do not differentiate between automatic and conventional machines and the request for estimates did not do so. But an idea of how large a factor automatic washers are in the market is

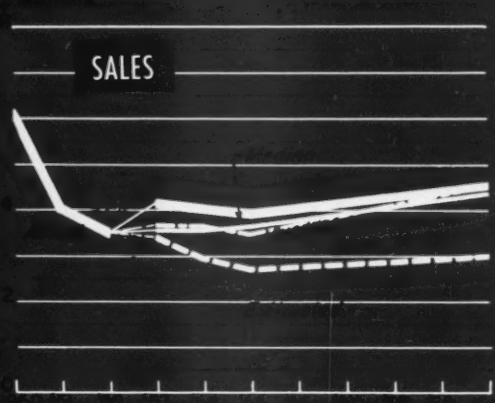


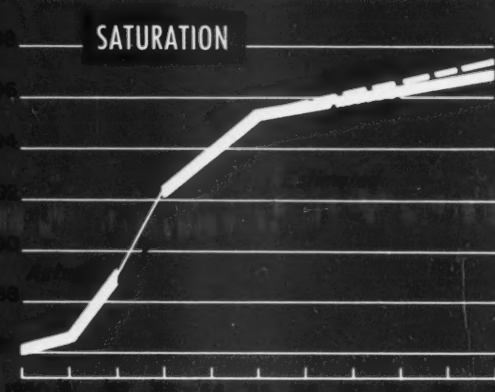


Dishwashers—
Estimates of Unit Sales (1,000)

(1952 Sales—210,000)

	1953	1954	1955	1960
1	300	350	400	500
2	300	300	280	350
3	275	300	350	500
4	275	375	450	1,000
5	250	....	....	.....
6	240	280	270	600
Averages	**273**	**321**	**350**	**690**
Medians	**275**	**300**	**350**	**600**





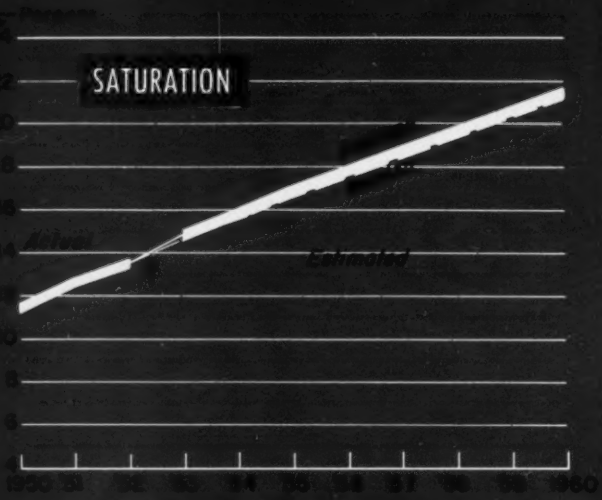
Electric Refrigerators—
Estimates of Unit Sales (1,000)

(1952 Sales—3,570,000)

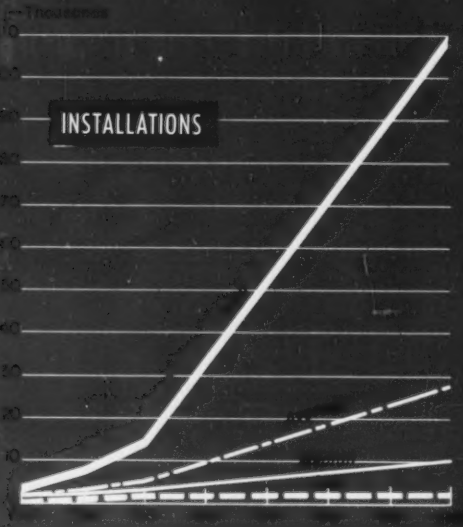
	1953	1954	1955	1960
1	4,200	4,100	4,000	4,500
2	4,000	3,600	3,500	4,500
3	3,800	3,800	3,750	4,500
4	3,700	3,900	3,600	4,500
5	3,640	3,300	3,000	4,300
6	3,600	3,700	4,000	4,500
7	3,600	3,700	3,700	4,000
8	3,500	3,500	3,000	4,000
9	3,500	3,400	3,300	4,000
10	3,500	3,000	2,750	3,000
11	3,500	3,600	3,750	5,000
12	3,450	3,600	3,800	4,200
Averages	**3,666**	**3,608**	**3,513**	**4,250**
Medians	**3,600**	**3,600**	**3,650**	**4,350**

afforded by the estimates of two manufacturers on those only. From these figures it would appear that more than half of present sales are of automatics and that by 1960 they will dominate the market.

ELECTRIC WATER HEATERS



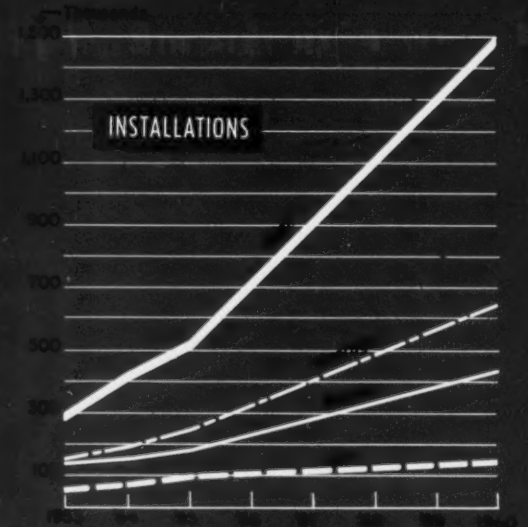
RESIDENTIAL HEAT PUMPS



Residential Heat Pumps
Estimates of Numbers in Use

	1953	1954	1955	1960
1	4,100	8,500	15,000	110,000
2	2,000	2,500	3,000	10,000
3	1,500	2,000	2,500	3,000
4	800	1,500	3,000	12,000
5	400	1,000	2,000	5,000
Averages	**1,760**	**3,100**	**5,100**	**28,000**
Medians	**1,500**	**2,000**	**3,000**	**10,000**

ELECTRIC HOUSE HEATING



Electric House Heating
Resistance Units—Estimates of Installations in Use

	1953	1954	1955	1960
1	300,000	425,000	525,000	1,500,000
2	200,000	280,000	400,000	500,000
3	175,000	195,000	225,000	375,000
4	107,000	119,500	144,500	500,000
5	65,000	75,000	100,000	150,000
6	60,000	80,000	100,000	200,000
Averages	**151,167**	**195,750**	**249,083**	**645,000**
Medians	**141,000**	**157,250**	**184,250**	**437,500**

Electric Water Heaters—Estimates of Unit Sales (1,000)

(1952 Sales—720,000)

	1953	1954	1955	1960
1	1,173	1,231	1,290	1,582
2	1,000	1,200	1,400	2,000
3	1,000	1,000	1,000	1,500
4	900	900	850	1,250
5	880	800	760	1,800
6	850	950	1,000	1,800
7	850	900	950	1,100
8	800	830	840	1,000
9	800	850	900	1,100
10	800	825	750	1,000
11	800	900	800	1,400
12	780	800	860	1,200
13	750	.....	.....	.....
14	733	745	760	650
15	730	.....	.....	1,000
16	700	650	700	1,500
17	700	650	780	850
18	700	725	750	850
19	700	690	650	600
20	700	.....	.....	.....
21	650	600	650	750
Averages	**809**	**851**	**872**	**1,227**
Medians	**800**	**828**	**820**	**1,150**

High and low estimates (millions) for 1953 are 3.54 and 2.9; for 1954, 3.4 and 2.8; for 1955, 3.5 and 2.8; for 1960, 4.8 and 3.0. Averages and medians, in millions, for 1953 are 3.165 and 3.2; for 1954, 3.114 and 3.1; for 1955, 3.21 and 3.2; for 1960, 3.57 and 3.35.

The saturation of clothes washers was 76.2% in 1952. Figuring on the averages of sales estimates, the saturation in 1960 comes to 89.6%.

On the basis of average retail value per unit of $213 in 1952, the money volume of the clothes washer market 1953 through 1960 amounts to $5,669,847,000.

Radio Receivers (Data, page 150)

Drop-off in sale of radio receivers (6,599,000 in 1952) is anticipated by 4 of the 7 makers giving estimates. For 1954 from 1953, a decline in sales is expected by 5 of the 7, while 3 expect a further decline in 1955, and 5 estimate that 1960 sales will be less than those of 1952.

The high and low estimates (millions) for 1953 are 7.0 and 5.0; for 1954, 7.0 and 4.0; for 1955, 7.5 and 3.5; for 1960, 8.7 and 2.5. These differences show a considerable divergence of thinking among makers. Average and median estimates also in millions are: 6.243 and 6.5 for 1953; 5.868 and 6.0 for 1954; 5.771 and 6.0 for 1955; 5.6 and 6.0 for 1960.

Anything approaching exact determination of saturation of radio receivers in wired homes is practically impossible. The figure of 96.2% for 1952 published by "Electrical Merchandising," January, 1953, is for homes with one or more radios. Continuing to figure on this basis and allowing for a generous mortality among radios now in use allows quite shaky guesses of 98.1% in 1960 if future sales follow the averages of estimates and 98.5% if the medians.

On the basis of average retail value of $34.95 per unit in 1952, the money volume of the radio receiver market 1953 through 1960 amounts to $1,611,505,000.

Residential Heat Pumps (Data, page 148)

No competent data on number of homes with heat pumps are available. Estimates from 5 makers on the number of installations in 1953 ranges from 400 to 4,000; in 1954, from 1,000 to 8,500; in 1955, from 2,000 to 15,000; in 1960, from 3,000 to 110,000. It is possible that the low estimates result from misunderstanding of the request, are of installations sold in the year instead of installations in use.

The averages and medians of estimates for 1953 are 1,760 and 1,500; for 1954, 3,100 and 2,000; for 1955, 5,100 and 3,000; for 1960, 28,000 and 10,000.

Estimates of energy used per year by a heat pump installation vary from 7,500 to 15,000 kwhr, with an average of 12,750 and a median of 14,250 kwhr.

Comparing the average 11,700 kwhr per year for complete house heating with resistance equipment with the average of 12,750 kwhr for a heat pump, plus consideration of coefficient of performance, indicates that the market is in the class of larger and more expensive homes.

Electric House Heating (Data, page 148)

Data on the number of homes completely heated with electricity are scarce. To our knowledge, no definitive compilation of them has yet been made. Estimates for 1953 made by 6 suppliers of resistance heating equipment vary from 60,000 to 300,000. Variation in estimates of the number in 1954 is from 75,000 to 425,000; in 1955, from 100,000 to 525,000; in 1960, from 150,000 to 1,500,000. Reducing this range of estimates to averages and medians gives 151,167 and 141,000 for 1953; 195,750 and 157,250 for 1954; 249,083 and 184,750 for 1955; 645,000 and 437,500 for 1960.

Estimates of average energy use per year are 12,000 kwhr from 4 suppliers and 10,500 kwhr from another. The average of estimates is 11,700 kwhr. Average connected load, estimated by 5 suppliers, ranges from 9 to 12 kw, indicating an apparent belief that almost all installations are in small houses.

Electric Cooling and Combustion Heating

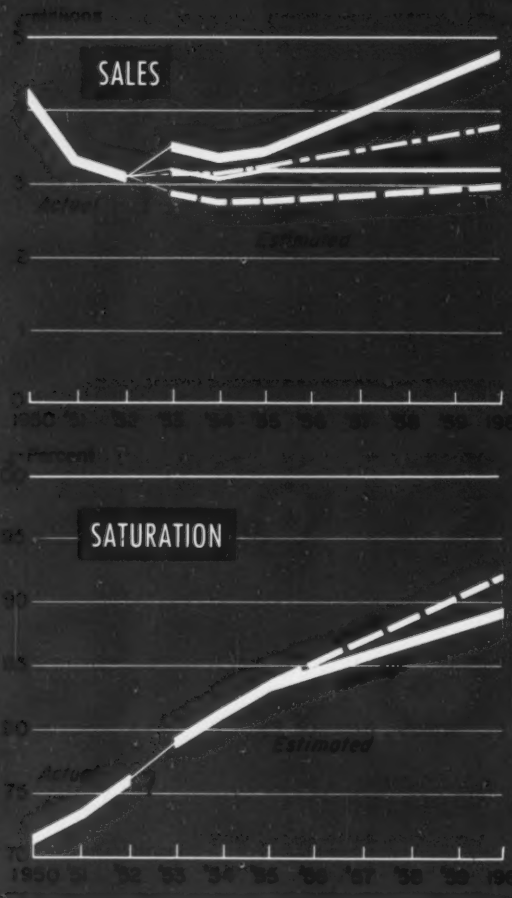
Central heating and cooling equipment—unit combination of heat pump and fuel-fired furnace—is already established as a product of several manufacturers. Estimates of installations in use were received from two makers and are quite close together—50,000 and 40,000 in 1953; 75,000 and 80,000 in 1954; 100,000 and 125,000 in 1955; 300,000 and 200,000 in 1960. But the two makers have widely different ideas of annual energy use. One said 1,800, the other 5,300 kwhr.

Average Energy Usage

Of the 2,175-kwhr average annual energy usage per residential customer in 1952, it is calculated that the twelve appliances covered in this survey were responsible for 1,503. This figure was arrived at by adding together the contributions of the 12 appliances to annual usage. The amount each contributed in any year is the product of the average annual usage of the particular appliance multiplied by its saturation percentage of that year.

For instance, the average electric range uses 1,200 kwhr per year. Its saturation ratio in 1952 was 24.1%. The contribution of the range to average annual usage per

CLOTHES WASHERS



Clothes Washers—
Estimates of Unit Sales (1,000)

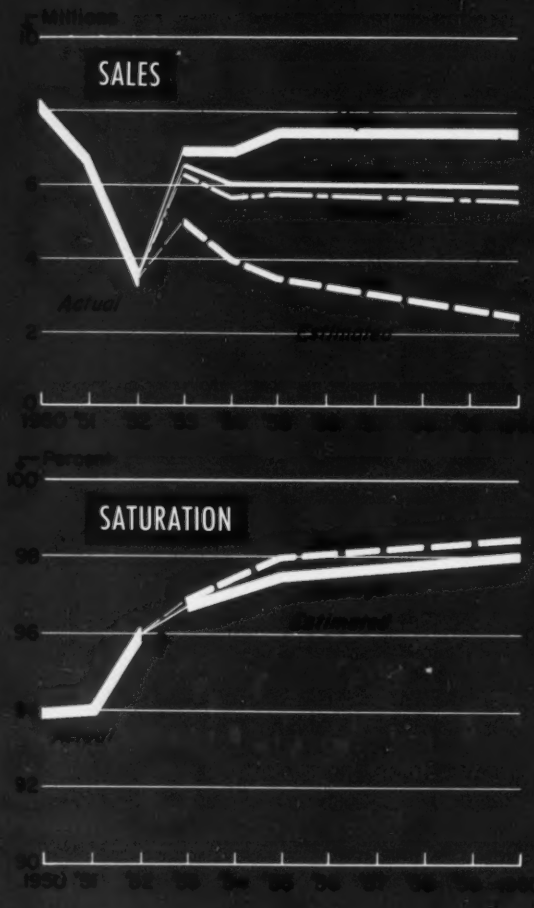
(1952 Sales—3,145,000)

	1953	1954	1955	1960
1	3,540	.....	.....	.....
2	3,400	3,200	3,300	3,500
3	3,300	3,400	3,500	4,000
4	3,300	3,200	3,400	3,700
5	3,250	3,300	3,500	4,800
6	3,200	3,400	3,500	4,100
7	3,000	3,000	3,000	3,000
8	3,000	3,000	3,100	3,200
9	3,000	3,000	3,000	3,000
10	2,923	2,838	3,000	3,200
11	2,900	2,800	2,800	3,200
Averages	**3,165**	**3,114**	**3,210**	**3,570**
Medians	**3,200**	**3,100**	**3,200**	**3,350**

Estimates on Automatic Washers Only

1,900	1,600	1,500	2,500
1,600	1,800	2,000	3,200

RADIO RECEIVERS



Radio Receivers—
Estimates of Unit Sales (1,000)

(1952 Sales—6,599,380)

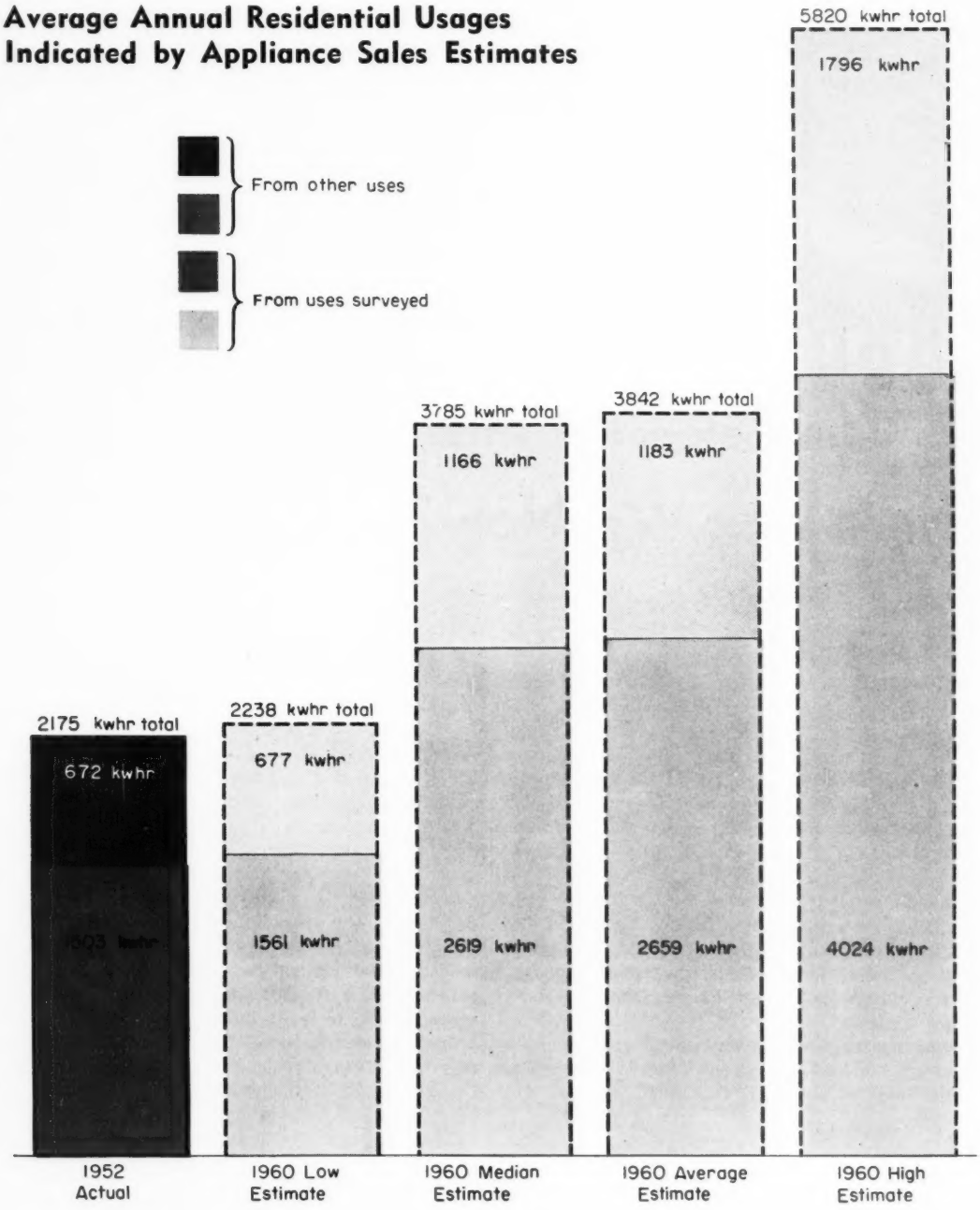
	1953	1954	1955	1960
1	7,000	7,000	7,500	7,500
2	7,000	6,500	6,000	5,000
3	6,700	5,300	6,900	8,700
4	6,500	6,000	6,000	5,000
5	6,000	6,000	6,000	6,000
6	5,500	5,000	4,500	4,500
7	5,000	4,000	3,500	2,500
Averages	**6,243**	**5,686**	**5,771**	**5,600**
Medians	**6,500**	**6,000**	**6,000**	**6,000**

residential customer is thus 289.2 kwhr. In this way the contribution of each appliance and application covered in the survey was calculated for 1960 on the bases of high, low, average, and median sales estimates. Their totals appear in the chart below.

Assuming that these figures will be in the same proportion to total average annual usage as the 1,503 kwhr is to the 2,175 kwhr of 1952, results in the following estimates of average annual residential kwhr in 1960: High 5,820; low, 2,238; average, 3,842; median, 3,785.

Obviously the figure of 5,820 kwhr is too high. To accept it would be to count on the highest estimate of sales of each covered appliance for each coming year through 1960. On the same reasoning the figure of 2,238 kwhr is obviously too low. This leaves the median and average figures to be accepted as reasonable. The average may be taken as nearer the mark because it agrees more closely with data arrived at by an entirely different approach published in Electrical World a year ago (May 19, 1952). At that time average annual residential consumption was estimated at 3,110 kwhr for 1956 and 4,120 for 1961. Straight-line interpolation gives 3,918 kwhr for 1960 which is not far off from the average figure of 3,842 kwhr reached in this study.

Average Annual Residential Usages Indicated by Appliance Sales Estimates



Where Are We Now?

C. M. TURNER, Chairman Load Research Committee, Association of Edison Illuminating Companies; Vice-President, Cincinnati Gas & Electric Co

There are those who have felt that we as a nation were moving into the final stages of the "S" growth pattern of the electric utility industry, but the rate of growth during the last few years and estimates for the near future indicate that we still are on the steep incline of this development cycle. Of all classes of electric service residential and farm is expected to have greatest growth in the future.

Electric Living . . . The all-electric home was a subject of the imagination a generation ago. It was something beyond realization, like the world of Buck Rogers. Today this idea is beginning to toddle around and within a short time will be sprinting, setting the pace for new construction.

This accelerated development has been brought about by several occurrances.

1. Manufacturers through continuing research have developed practical and efficient appliances that are priced within the value of service as established by more and more people.

2. The advertising and promotion profession has kindled a rapidly expanding desire for the comfort and convenience which is made possible by these appliances;

3. Less domestic help has been available.

4. Cost of operating these appliances and devices has become a smaller and smaller percentage of the family's income, due primarily to the fact that rates have not risen proportionately with the changes in prices and wages.

Appliance Saturation Rapidly Increasing . . . Electric cooking and water heating have been actively promoted for 30 years and acceptance has been accelerating to a point where in many areas free of cheap natural gas competition the saturation is comparatively high. The refrigerator has reached almost optimum saturation within 25 years. Automatic laundry equipment has been brought into the market relatively recently, and the demand therefor has been growing at an increasing pace. Television came in like a landslide and the demand for gadgets has been surprising. Air conditioning, particularly in the way of room coolers, is in its infancy but has definitely taken hold. It is expected that climate control combining heating, cooling, humidifying, and air cleaning will be the next big development in the home field. Some installations are being made in isolated developments.

There are some utility managements that would like to encourage electric air conditioning and heating. There are those who think it is not a load to be served electrically

with the greatest degree of economy and, therefore, would like to discourage the trend in this direction. On the other hand, there are utility managements that are not certain which is the correct path to follow. There appears to be much room for enlightenment through the supply of information which would permit management to make up its mind and to know that once having so decided it had reached the right conclusion.

Supply Any load . . . Utilities must do their part during this period by developing the saturation of appliances and equipment which are beneficial to the public's welfare and mode of living. As we are in the business of selling electricity, we should be willing to supply any load for which a customer wants service so long as we are adequately compensated for the furnishing of this service. If there are those who are not so willing, they may be prejudiced by some past experience or by the lack of knowledge of how to deal with the new or the unusual.

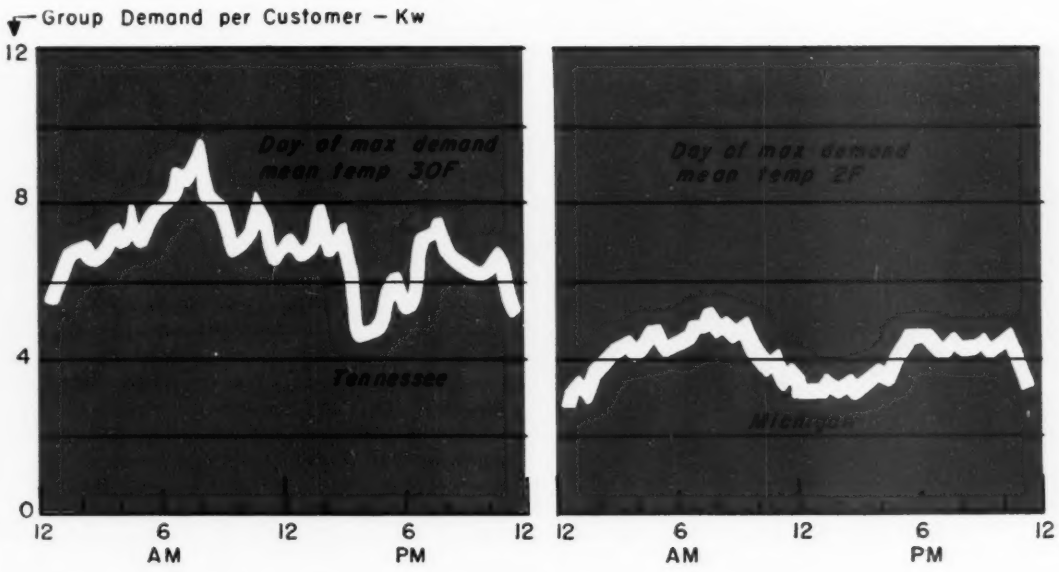
Looking back on history, it will be noticed that the initial use of new appliances was experimental, and their installations isolated. Increase in saturation was slow. Today, with modern methods of development and marketing there have been a faster acceptance and a more rapid increase in saturation of each new appliance. This means as new loads are imposed upon the utility systems there will be less time to experiment.

In order to be on the alert and in a position to supply any load which the customer might wish to attach at any time, we should have a knowledge of (1) the most flexible distribution system for our own particular operation (2) rates which are compensatory not only for the present but for probable conditions of the future, and (3) fundamentally sound promotional programs for maintaining or improving system load factor during this period of rapid growth.

Let us pause in retrospect to see how far we have come in attaining such knowledge. Is our system planning such as to offer the greatest flexibility, permit the greatest expansion, and still keep the investment per dollar of revenue at a minimum? Can these new loads be promoted to obtain the best saturation and yet be served to return the most in the way of net earnings? Research into load characteristics is desirable as an aid to management in deciding the correct answer to these questions and under what conditions it can fulfill its obligations to serve any load.

Field Tests Are Needed . . . Load research requires field tests and many utility men think field tests cost too much money. Load research, including the field tests and all the analyses that go with them, do not *cost* money—they *save* money. It is true there is an outlay in the way of capital and operating expense in making these studies, but like research in any business it is a phase of operation which is self-supporting and pays off in increased earnings.

Residential Electric Space Heating

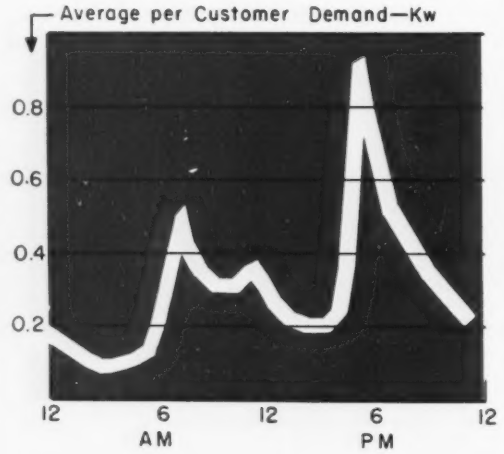


The load curve for a group of heating customers in Tennessee is for a day reported to have a mean temperature of 30 F. A company in Michigan wishing to use these data to simulate a load curve for heating load in its area might expand demands shown in the Tennessee load curve in proportion to heat requirements resulting from a temperature 28 deg colder, or 2 F. This procedure would provide demands much in excess of those determined to be a fact in an actual test of 20 customers in Michigan for a mean temperature of 2 F. Hasty conclusions drawn by one utility from another utility's data in this case would result in over investment in electric plant facilities

To know what is going on in its own "backyard," a utility should conduct tests and perform its load research on its own system in preference to "borrowing" data determined by others. Borrowed data can be helpful but even when adjusted for known differences it is quite possible that variations in methods of distribution, kind of terrain, customer density, customer habits, competition, and other factors not evident on the surface might introduce serious inaccuracies into conclusions used to determine long term policy. Such inaccuracies can prove to be costly.

Establishing Preliminary Policies . . . Because tests are required on a number of installations operating under similar conditions to obtain stable and reliable data, it might not be possible for a utility to make field surveys on new appliances having a minute saturation such as households with complete electric equipment including air conditioning and radiant heating or homes in which heat pumps are installed. In situations such as these it is desirable to obtain and analyze studies on the subject which have been made by other utilities under comparable conditions. If such studies are adjusted to reflect current local conditions, the results will provide an approximate pattern which might be expected on the subject utility's system. This pattern may be used in establishing preliminary policies but should be watched and corrected as local information becomes more readily available. It also should be checked and even replaced when it is possible to perform tests on a sufficient number of these customers on the local system.

Representative Residential Load Curve



Assume this to be the load curve of an average customer in a group of residential customers in Xtown, Michigan, having lighting, refrigeration and an electric range. Should a utility in Yville, Maine, establish operating policies based on data shown here? The curve is quite typical of urban use. But will management in Yville be informed that the load of these customers might be 10% greater between 4 and 6 P.M. than is shown here due to difference in longitude

In scrutinizing the results of load characteristics studies of others it is well to remember that the time (longitude) element as well as customer habit is of importance. For example, it might seem logical that the shape of a daily load curve of residential customers having lighting and cooking in Xtown, Michigan, and customers with the same appliances located in Yville, Maine, would be the same. Cooking may be done by both groups of customers to the same extent and at the same clock hour with range peaks established at 5:30 PM. However, there is about a one hour difference in sun time between the two locations so that the contribution of lighting at the time of the range peak will be less in Xtown than in Yville. This could result in as much as a 10% effect on the peak. A similar problem arises as the result of difference in latitude when air conditioning or room cooler appliances are the subject of study. The load factor of this kind of load for a particular day or week might be the same in Chicago as in Houston, Texas, but the annual load factor is much lower in the north than in the south. Load curves of space heating can be particularly misleading.

Other Considerations . . . Besides latitude and longitude many other things should be considered in making adjustments in load data of other utilities before putting them to use in one's own analyses. For example, were the test data which it is desired to use predicted on a true sample and were the customers homogeneous so that the results are truly representative? It should be known if the test units—be they appliances or customers—bear reasonable relationship to those being considered locally.

In using cooling or heating data of a contemporary it is important to know whether adjustments must be made for number of persons in the family (particularly children running in and out of doors), kind and size of structure, extent of insulation, central or room units, conditioned areas, appliance ratings, location, degree hours of cooling, and degree days of heating. Even with a knowledge of all this information there are a number of influencing factors that can be determined only by local tests.

Techniques of Other Companies Available . . . There is available to individual utilities who wish to make field surveys and engage in their own studies a booklet, "Manual of Procedure for Load Surveys," prepared by the Load Research Committee of the Association of Edison Illuminating Companies, which can be obtained from the Edison Electric Institute. It describes the methods and techniques used in obtaining samples, preparing for the tests, installing and removing test equipment, and compiling and analyzing test data. The "know how" learned through experience by many companies is made available in this manual so that all that is necessary in order to have a more complete knowledge of local operating characteristics is to become inspired to carry on and to budget.

To establish sound policies for guiding operations during this period of accelerated growth, management must have the right tools. Because the tools for operating the individual systems are different, it is desirable, if not absolutely necessary, that each utility construct its own implements for use in such an important matter as policy making. Investment runs too high now and the margin between revenues and expenses too small to permit large factors of safety in system construction or much experimentation with rate design and sales promotion.

Let's Look at Load Studies

On the preceding pages C. M. Turner has demonstrated that individual utilities must conduct their own local load characteristics surveys.

On the following pages Electrical World presents eight sample studies as examples of what is being done.

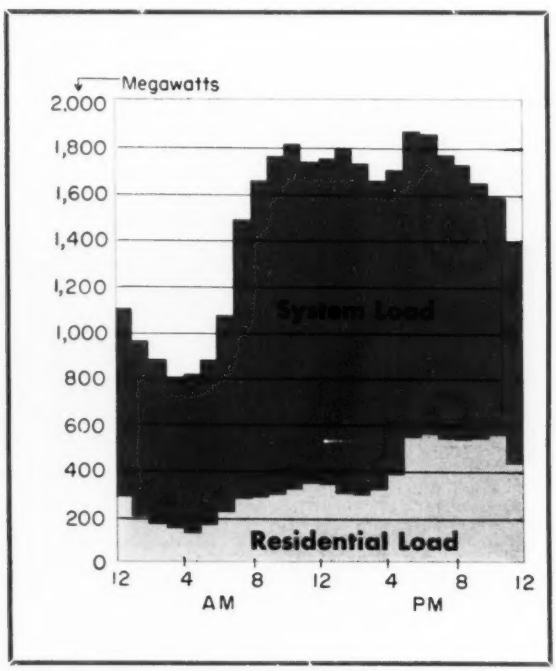
From time to time in the months to come Electrical World will publish details of other studies and load survey programs.

How Electric Living Affects the Load Curve

Load balancing through the promotion of selected revenue-building appliances is an answer to one of the most important problems facing electric utilities today.

In order to get the most out of its new and costly equipment, Detroit Edison developed a five-year, load-balancing program aimed at improving the demand pattern of the residential load curve.

In the development of such a promotional program Detroit Edison selected a number of load-building appliances and then began a series of surveys and tests on these appliances to answer these questions:



System and Residential Load Curves on the day of Detroit Edison's annual peak, Dec. 23, 1952. The residential curve, approximately ¼ of the system load, follows the system curve very closely. It indicates that an improvement in the residential demand pattern will have a very definite and positive effect on the system pattern

1. What are the use and load characteristics of the appliance or appliances?

2. What is the maximum simultaneous demand at varying saturations?

3. When does this demand occur, and how does it fit into the class and overall load patterns?

4. How will the residence and system load be affected by the addition of large numbers of these appliances?

5. Would the appliance or appliances perform a satisfactory labor saving service to the customer at a reasonable cost and require a minimum of service by the customer and the company?

As a result of these studies Detroit Edison singled out the range, dryer, water heater, and freezer for immediate promotion. These four appliances, in the proper saturation, complement each other to the extent that a fairly evenly distributed demand pattern would result.

Establish Range As Sales Leader . . . After appliances to be included had been determined, surveys were made to determine how best to promote them. In these surveys it was discovered that customers who already owned electric ranges, in almost every case, had a higher saturation of the other load-building appliances regardless of their living standards. In other words, it appeared that the range should be one of the first major appliances to be sold to the residential customer because the ownership of an electric range in itself would help to sell other appliances.

Thus, in spite of the fact that the range is not one of the most desirable appliances, because of its contribution to evening peak loads, it was decided to establish it as a sales leader.

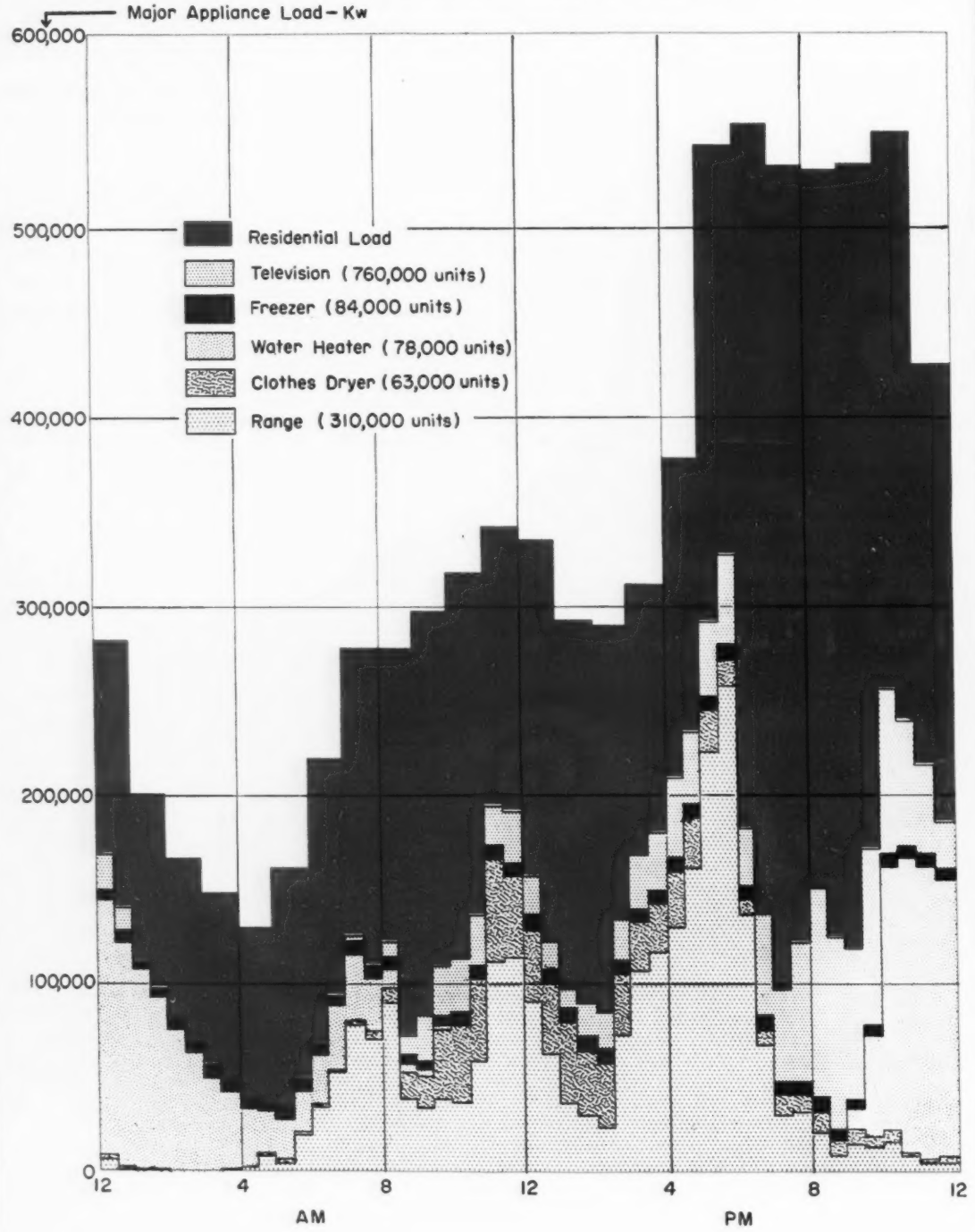
Range sales during 1952 brought the present total in service up to 310,000 for a saturation of about 33½%.

The present load of 63,000 dryers added to the range load shows the extent to which they complement each other. Peak dryer use occurs around 11 am and adds little to the critical 5-6 pm peak. But it does fill in some of the low use hours.

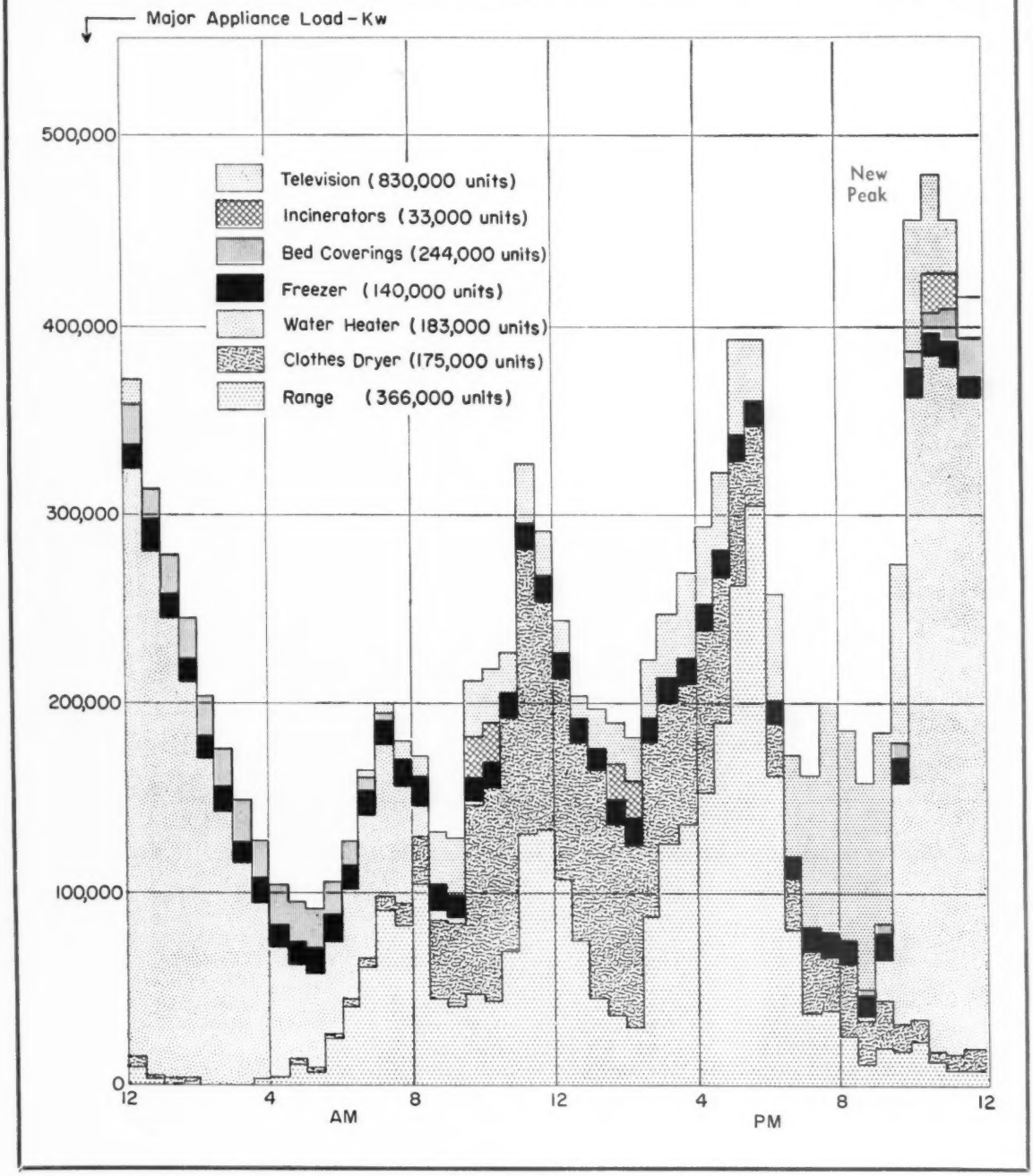
Since the beginning of the program about 43,000 electric dryers have been added increasing saturation from 2.3 to 6.8%. Dryer saturation goal set for 1955 is 18%.

As shown on the chart, the off-peak water heater load

Detroit Edison's Appliance Load Curve as It Appears Today



1955 Appliance Load Curve—Reshaped by Detroit Edison's Load Balancing Program



partially fills in the late evening and early morning valley hours. Detroit Edison considers it to be one of the most important residential loads. The present total of 78,700 provides an 8.4% saturation.

The freezer, since it has a fairly uniform 24 hour load, has a very desirable load factor. Though it does not specifically fill in the low use hours, neither does it present any problems by creating new peaks. Over 30,000 freezers have been added since the beginning of the program. By 1955 it is hoped that the saturation will increase to about 13%.

Since the start of the program two new appliances, the electric incinerator and bed coverings, have been added. Both are considered excellent load builders, and provide a new and attractive convenience to the customer.

With over 760,000 television sets in use, saturation is in excess of 81%. It is expected that it will increase to about 85% by 1955.

Atlantic City Studies An All-Electric Project

Primary objectives of the Atlantic City Electric Co's study of the 20-home, all-electric development at Northfield, N. J., was to determine:

1. Relationship of heating load to demand
2. Diversity of heating load
3. Loading of distribution transformers.

These homes are heated entirely by electric radiant glass panels. They are of frame construction and range in size from 5,825 to 7,100 cu ft with one of 9,100 cu ft. All are insulated and equipped with storm sash. Average radiant panel load for the settlement was 6.6 kw per home.

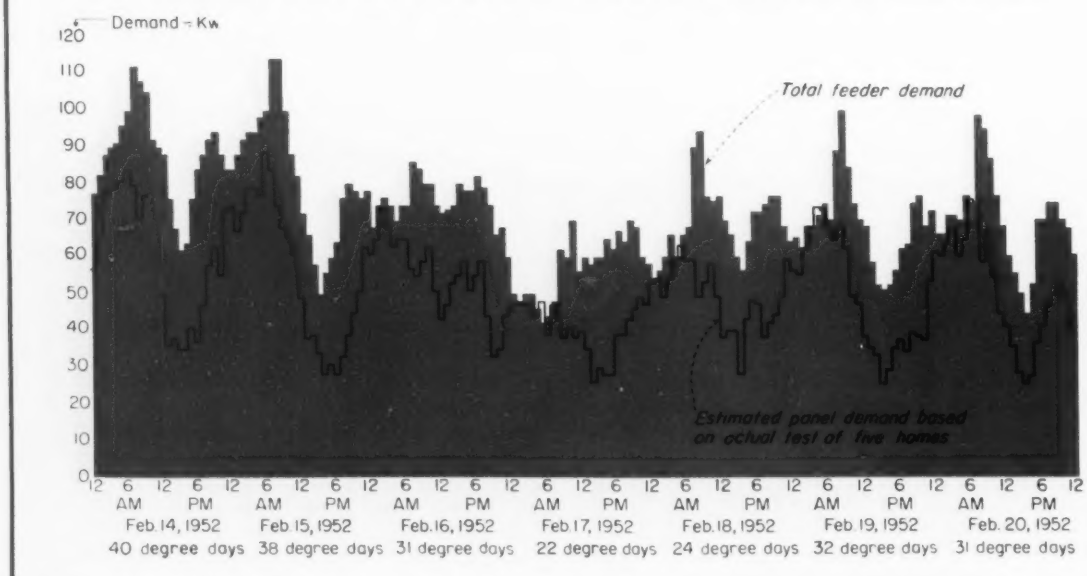
During 1951-52 heating season, this settlement had a total load of 398 kw. Of this 132 kw was in heating panels, 200 kw in ranges, 16 kw in bottom elements of uncontrolled water heaters, and 50 kw in lighting and miscellaneous appliances.

Electric Radiant Glass Heating at Oak Park Manor, Northfield, N. J.
1951-52 Heating Season

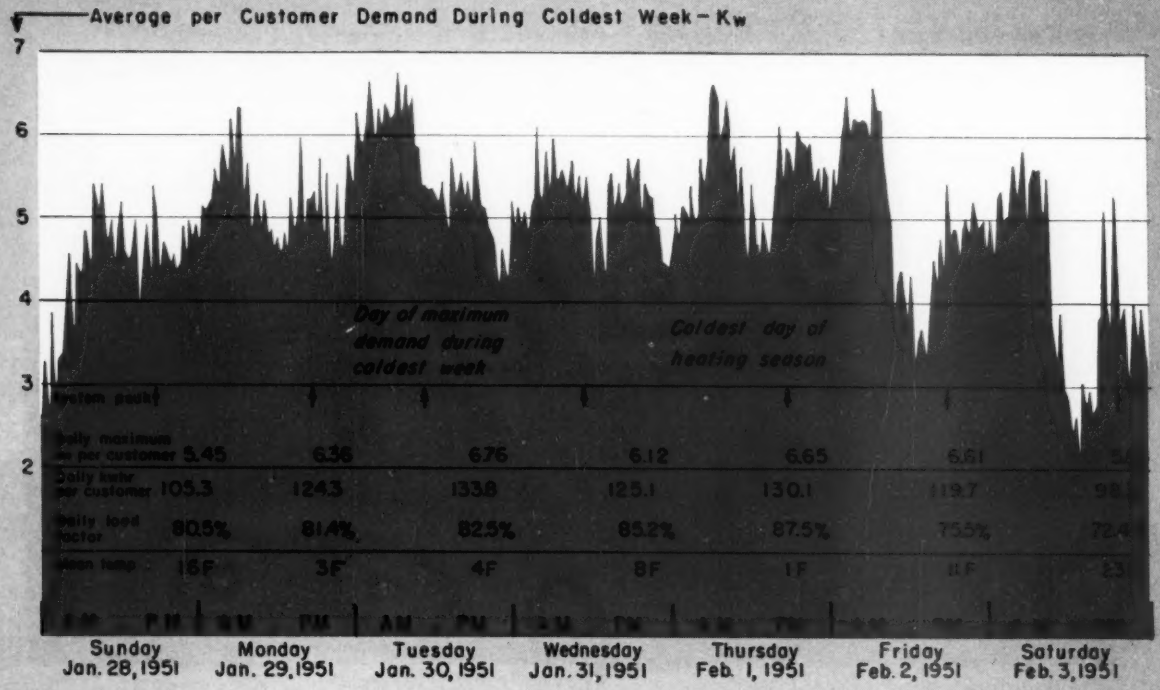
Weekly Test Periods	Degree Days	House 1				House 2				House 3				House 4				House 5			
		Kwhr for Heating	Maximum Demand	Heat Factor	Demand Factor %	Kwhr for Heating	Maximum Demand	Heat Factor	Demand Factor %	Kwhr for Heating	Maximum Demand	Heat Factor	Demand Factor %	Kwhr for Heating	Maximum Demand	Heat Factor	Demand Factor %	Kwhr for Heating	Maximum Demand	Heat Factor	Demand Factor %
1-31 to 2-7	170	380	6.8	0.383	122	315	6.8	0.317	104	255	5.9	0.257	105	230	7.0	0.232	125	190	4.2	0.191	75
2- 7 to 2-14	215	445	6.6	0.353	118	350	4.3	0.278	77	370	6.5	0.295	116	290	6.4	0.232	114	235	5.4	0.187	97
2-14 to 2-21	204	477	5.8	0.400	104	366	6.0	0.308	107	462	5.3	0.388	95	292	6.4	0.244	114	268	4.9	0.225	88
2-21 to 2-28	218	491	7.0	0.385	125	355	5.9	0.278	105	384	5.5	0.301	98	311	6.7	0.244	120	242	4.4	0.191	79
2-28 to 3- 6	211	494	6.7	0.400	120	362	5.0	0.295	89	319	6.4	0.259	114	317	6.1	0.259	108	287	5.4	0.233	97
3- 6 to 3-13	191	430	6.4	0.381	114	284	4.7	0.255	84	264	6.2	0.237	111	282	6.6	0.250	118	231	4.3	0.205	77
3-13 to 3-20	201	411	6.7	0.351	120	296	5.4	0.252	96	279	6.6	0.238	118	275	6.5	0.234	116	207	4.1	0.184	73
3-20 to 3-27	148	290	6.2	0.336	111	200	5.2	0.232	93	334	6.9	0.387	123	186	5.4	0.216	96	139	3.6	0.161	64
3-27 to 4- 3	138	242	6.0	0.301	107	181	4.2	0.225	75	334	5.8	0.415	104	133	4.8	0.166	86	85	3.4	0.106	61
4- 3 to 4-10	121	251	5.4	0.356	96	191	4.8	0.271	85	303	5.4	0.430	96	159	4.8	0.216	86	110	3.5	0.156	63
4-10 to 4-17	117	224	6.0	0.328	107	168	4.7	0.247	84	242	5.4	0.355	96	121	5.0	0.178	89	75	4.1	0.110	73
4-17 to 4-24	43	48	3.7	0.192	66	37	4.6	0.148	82	40	4.3	0.160	77	21	3.6	0.084	64	1	2.5	0.004	45
4-24 to 5- 1	88	243	5.0	0.474	89	194	4.5	0.378	80	267	6.0	0.520	118	159	4.6	0.310	82	81	3.6	0.158	64
5- 1 to 5- 8	60	110	3.6	0.315	64	73	3.5	0.209	69	88	4.7	0.252	84	23	4.2	0.066	75	18	2.6	0.052	46
5- 8 to 5-15	50	94	3.6	0.322	64	73	6.1	0.251	109	61	5.2	0.209	93	37	3.6	0.127	64	6	.84	0.026	15
5-15 to 5-22	46	86	3.6	0.321	64	42	3.1	0.157	55	79	4.6	0.295	82	45	3.4	0.168	61	13	3.5	0.048	62
5-22 to 5-29	16	29	3.8	0.311	68	36	3.4	0.386	61	35	4.3	0.376	77	15	2.4	0.161	43	1	1.8	0.017	32
1-31 to 5-29	2237	4745		0.364		3513		0.270		4116		0.316		2889		0.222		2189		0.168	

Heat Factor — Kwhr/1000 cu ft deg day
Demand Factor — Maximum weekly demand — connected load

Characteristics of Atlantic City Electric Co's 20-Home All Electric Project


Demand - Kw
120
110
100
90
80
70
60
50
40
30
20
10
0
Total feeder demand
Estimated panel demand based on actual test of five homes
12 6 12 6 12 6 12 6 12 6 12 6 12 6 12 6 12 6 12 6 12 6 12 6 12 6 12 6 12
AM PM AM PM AM PM AM PM AM PM AM PM AM PM
Feb. 14, 1952 Feb. 15, 1952 Feb. 16, 1952 Feb. 17, 1952 Feb. 18, 1952 Feb. 19, 1952 Feb. 20, 1952
40 degree days 38 degree days 31 degree days 22 degree days 24 degree days 32 degree days 31 degree days

Load Characteristics of Seven Radiant Panel Electric Heating Installations


Average per Customer Demand During Coldest Week – Kw
7
6
5
4
3
2
Day of maximum demand during coldest week
Coldest day of heating season
System peak
Daily maximum kw per customer 5.45 6.36 6.76 6.12 6.65 6.61
Daily kwhr per customer 105.3 124.3 133.8 125.1 130.1 119.7
Daily load factor 80.5% 81.4% 82.5% 85.2% 87.5% 75.5%
Mean temp 16F 3F 4F 8F 1F 11F
Sunday Jan. 28, 1951
Monday Jan. 29, 1951
Tuesday Jan. 30, 1951
Wednesday Jan. 31, 1951
Thursday Feb. 1, 1951
Friday Feb. 2, 1951
Saturday Feb. 3, 1951

Union Electric Co Studies Space Heating

During the 1950-51 heating season Union Electric Co metered the electric space heating installations of seven of its customers. An effort was made to obtain houses of uniform size and adequate insulation. Houses chosen were four or five room, single family, varying from 5,768 to 9,607 cu ft of heated space. Three of the seven had basements.

In each the roof and walls were insulated, and, in addition, four had floor insulation. Six were equipped with storm windows.

The nameplate rating of the load varied from 5 to 9.2 kw, averaging 7.46 kw per home or about 1 kw for each 1,000 cu ft of heated space.

Theoretical load, based on the calculated heat loss, averaged 9.07 kw, some 22% higher than the actual load.

The average customer was metered during a period including some 4,760 degree days. This average customer's space heating use was 12,520 kwhr. Other use averaged 6,013 kwhr per year.

Maximum coincident ½ hour integrated per customer demand was 6.76 kw.

Summary of Results Obtained from Tests of Seven Radiant Panel Electric Heating Installations
Averages Per Customer

Characteristics of test metered homes

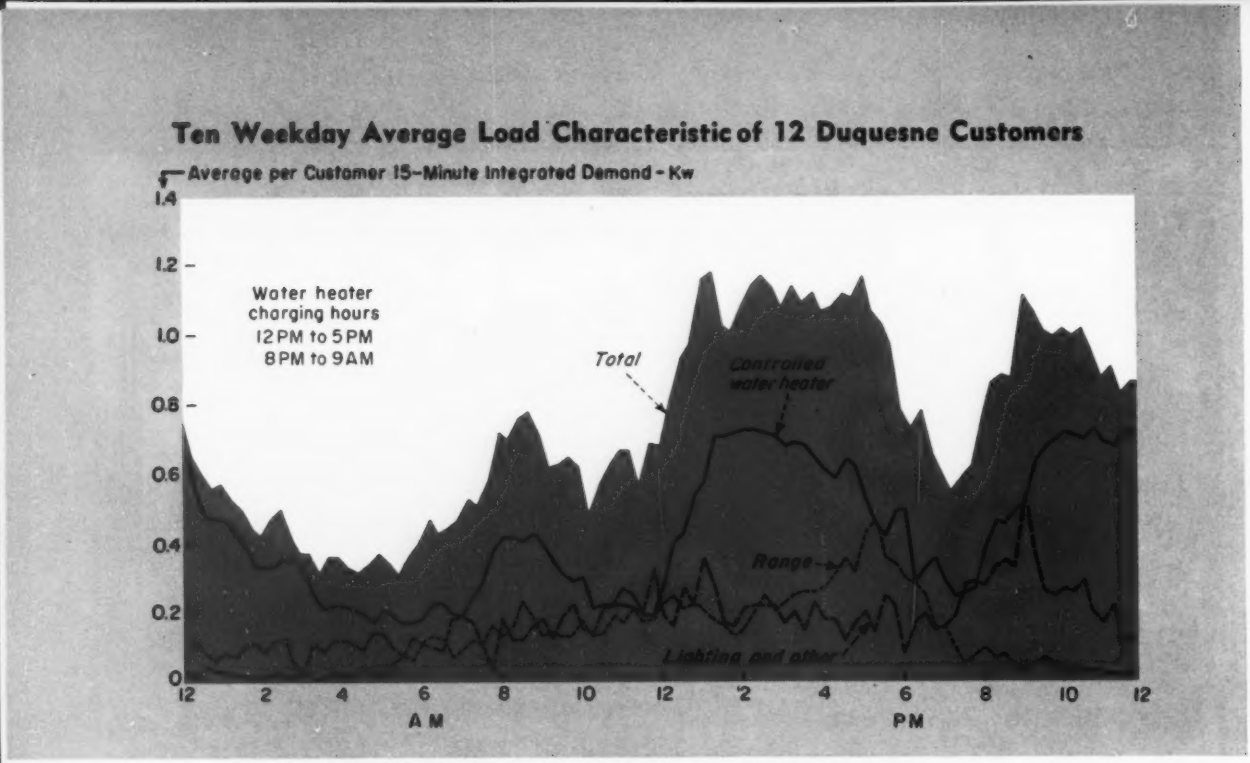
Number of rooms excluding bath	4.3
Heated volume—outside measurements in cu ft	7,610
Heat loss—Btu/hr	30,960
Number in family	3.9
Connected Load—name plate in kw	7.46

Space heating unit figures

Kwhr per degree day	2.52
Kwhr per degree day per 1,000 cu ft	0.33
Kwhr per degree day per kw of connected load	0.34
Kwhr per cu ft	
Normal year (4587 DD)	1.52
1950-51 (4970 DD)	1.65

Use and Demand Data	Annual Period		Coldest Week		
	1950-1951	Normal Year	Day of Max Demand	Coldest Day	Average Weekday
Date of test period	Oct '50 -May '51	Sept- -May			
Energy use—kwhr[1]					
Space heating	12,520	11,560	133.8	130.1	126.6
Electric water heating[2]	3,390	3,390			
Other	2,623	2,623			
Total	18,533	17,573			
Degree Days (65 F Base)	4,970	4,587	61	64	59.6
Mean temperature—Deg F			4	1	5.4
Non-coincident maximum demand (30 minutes)	8.30[3]		7.28	7.39	7.28
Coincident maximum demand	6.76[4]		6.76	6.65	6.37
Time (on day of test period)			7:30 AM	7:30 AM	7:30 AM
Load factors					
Based on non-coincident demand	17.2%	16.0%	73.5%	73.4%	72.5%
Based on coincident demand	21.1%	19.6%	82.5%	81.5%	82.8%
Coincidence factors	81.4%	81.4%	89.2%	90.0%	87.5%

[1] Assuming all customers have electric water heating
[2] Average of six customers
[3] 15 minute demand
[4] Maximum day of coldest week



Ranges–Water Heaters Studied by Duquesne

First phase of a customer load study program, authorized by Duquesne Light Co in April of 1947, was a survey of residential customers whose load included both an electric range and a hot water heater.

The difference between controlled and uncontrolled water heaters was tested at the request of the sales department to determine whether it would be desirable to eliminate time controls.

The transition from daylight saving to standard time made it advisable to divide the tests into two groups. The first group containing 12 customers was tested from June 1 to Sept. 30, second group of 14 from Sept. 30 to Dec. 1.

Per Customer Summary of Range and Water Heater Load Survey Studies

	1st Group Tested				2nd Group Tested			Total		
1. Number of Customers 2. Time of Test 3. Location	12 June 1 to Sept. 30 Rural				14 Sept. 30 to Dec. 1 Rural			26 June 1 to Dec. 1 Rural		
	Total	Controlled Water Heaters	Uncontrolled Water Heaters	Ranges	Controlled Water Heaters	Uncontrolled Water Heaters	Ranges	Controlled Water Heaters	Uncontrolled Water Heaters	Ranges
4. Estimated Kwhr per month	515	315	325	95	270	325	115	295	325	105
5. Diversified demand—kw	1.7	1.0	1.0	0.8	1.2	1.1	0.9	0.9	1.0	0.7
6. Load factor (4 vs 5)	42.3%	43.7%	46.4%	16.8%	32.6%	41.7%	16.9%	44.4%	44.3%	20.7%
7. Average of maximum individual demands on day of diversified demand—kw	3.0	1.3	1.3	2.2	1.2	1.3	2.4	1.4	1.3	2.1
8. Load factor (4 vs 7)	23.8%	33.3%	35.1%	6.2%	31.5%	35.9%	6.6%	30.6%	36.0%	7.0%
9. Diversity factor (7 ÷ 5)	1.8	1.3	1.3	2.7	1.0	1.2	2.6	1.5	1.2	3.0
10. Average of maximum individual demands during 14 day period—kw	4.3	1.6	1.6	3.3	1.5	1.5	3.5	1.5	1.6	3.4
11. Load factor (4 vs 10)	16.7%	27.9%	28.9%	4.0%	26.1%	29.7%	4.5%	27.0%	29.3%	4.3%
12. Diversity factor (10 ÷ 5)	2.5	1.6	1.6	4.1	1.3	1.4	3.7	1.6	1.5	4.8
13. Average 10 weekdays	1.2	0.7	0.7	0.5	1.1	0.8	0.6	0.8	0.8	0.5
14. Load factor (4 vs 13)	60.2%	60.8%	62.4%	23.6%	34.5%	55.6%	27.7%	49.7%	59.7%	28.3%

West Penn Studies Water Heater Load

In order to obtain a load pattern for a greater customer coverage than previous load studies, West Penn Power Co selected a circuit serving 1,431 customers with 213 water heaters and 419 ranges.

The test covered a period of three weeks. On Saturday of the first week the water heater time clocks were made inoperative thus putting the heaters on a 24-hour basis.

On Saturday of the following week water heaters were reconnected to prevent operation of the booster element during on-peak period and to give standard operation during the charging period.

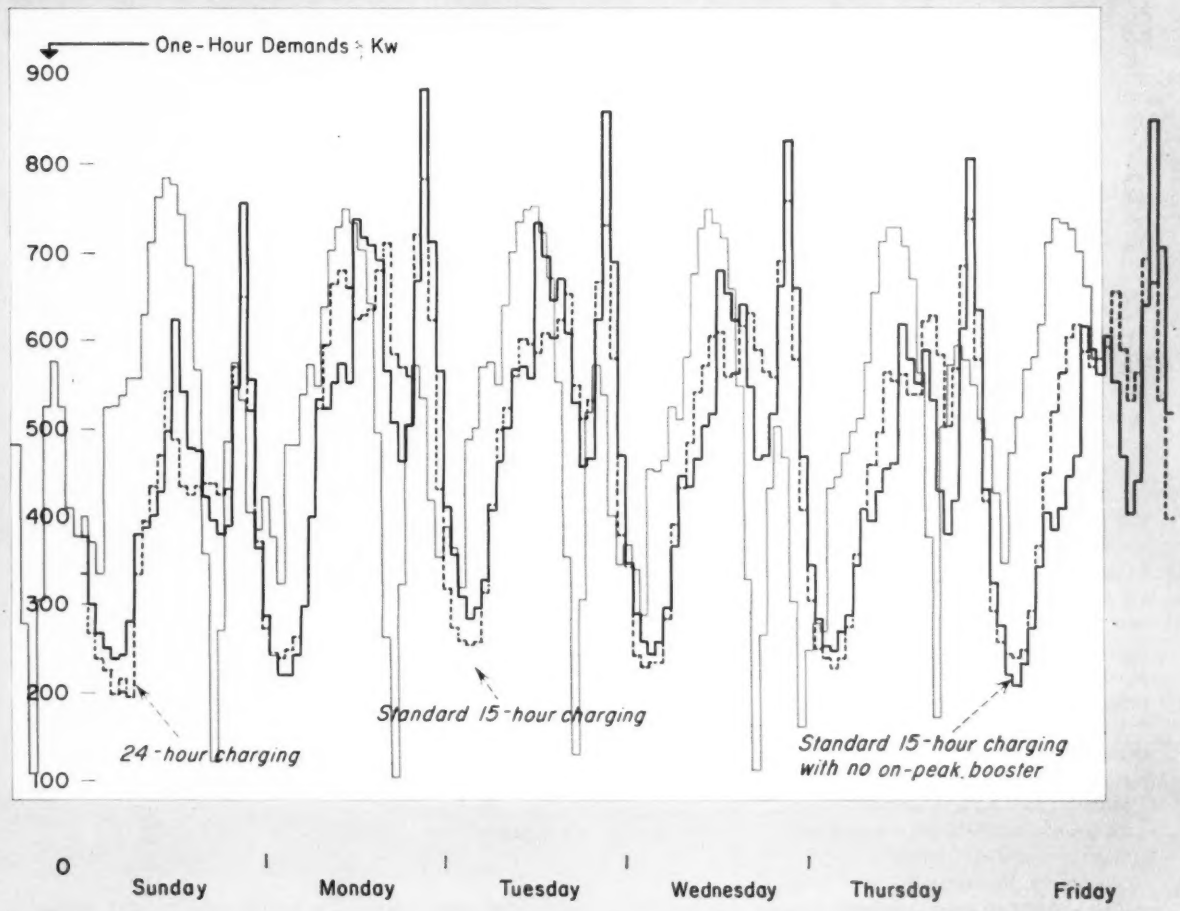
On the following Saturday connections were made for standard 15-hour controlled charging.

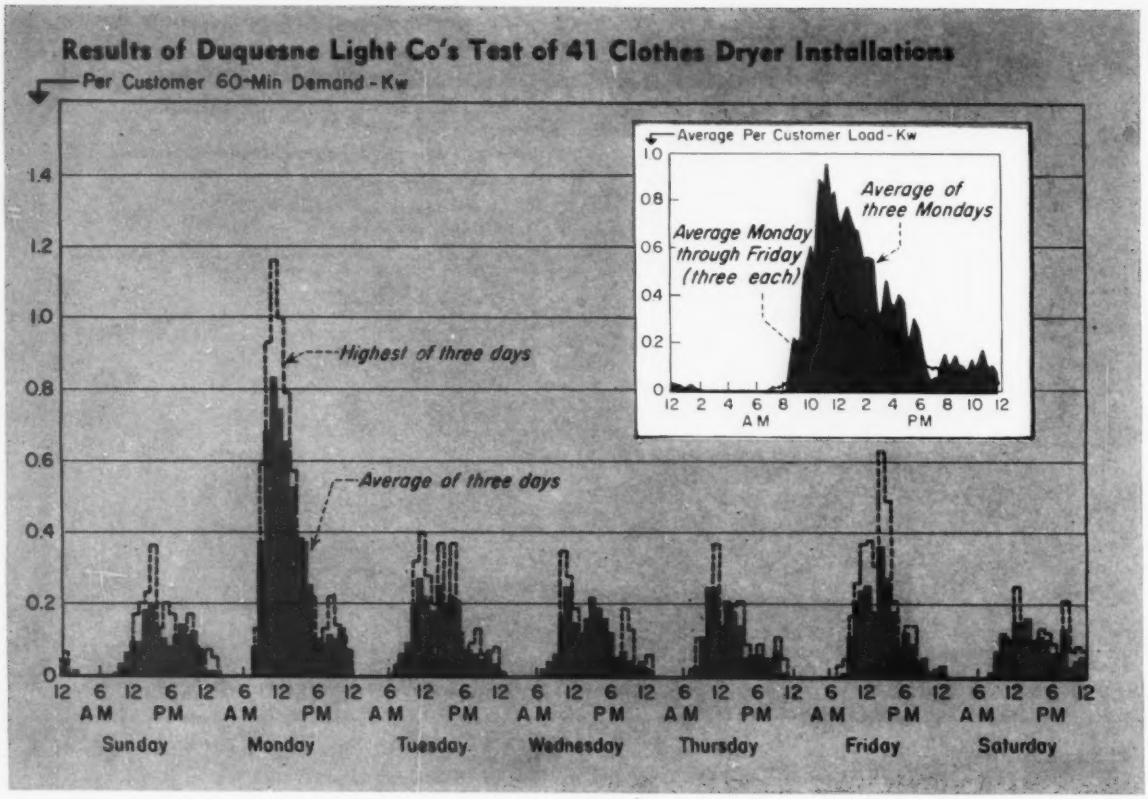
Shown here are the graphic meter charts converted to one-hour loads and adjusted to the same kwhr use level.

Summary of Test Circuit Date

Number of customers	1,431
Including a small number of commercial and industrial connections	
Number of residential ranges	419
Number of residential water heaters	213
Including 4 farm installations	
Average water heater consumptions per customer determined from regular monthly meter readings—Kwhr	
213 Customers on circuit	
July or August 1952 billing	255
Total system July 1952	249
Customers on circuit July 1951	259
Total system July 1951	251
Customers on circuit January 1952	324
Total system January 1952	297
Average tank capacities—Gal	
Customers on test	64
System average April 1952	62
Average element capacities—Watts	
Customers on test	
Lower element	1225
Booster element	1943
System average—April 1952	
Lower element	1184
Booster element	1870

West Penn Power Co Study Shows How Controlled and Uncontrolled Water Heaters Affect Feeder Load





Duquesne Studies Clothes Dryer Load

After contacting several hundred of its residential customers, the Duquesne Light Co sales department chose 60 for its test of electric clothes dryer load characteristics. The customers chosen were considered geographically and economically representative. They were also believed to be a reasonable cross section with respect to family size in that area.

Of the group chosen, 49 were metered, 41 were used for analysis. Of the dryers tested, 40 were rated between 3.9 and 4.9 kw and were operated at 220 volts ac. One dryer rated at 1.6 kw was operated at 115 volts ac.

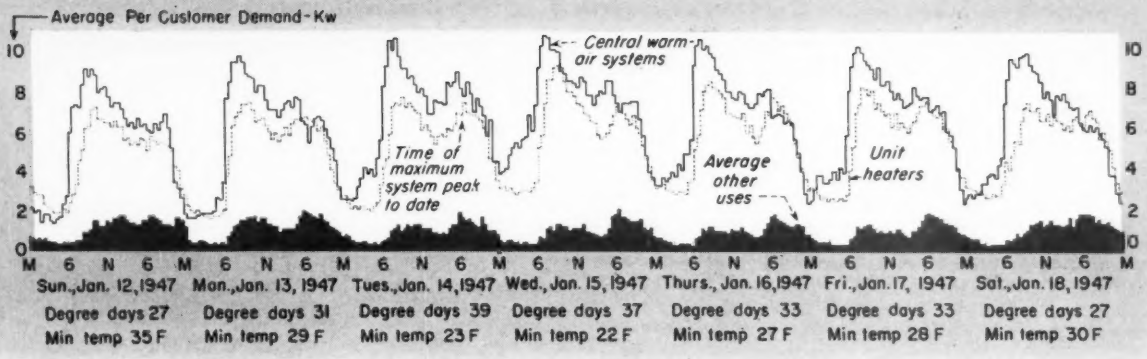
Group coincident 15 minute maximum demands during the test period ranged from 1.22 kw, at 11:30 am on a Monday, to 0.42 kw, for an average weekday also at 11:30 am. Individual maximum demands ranged from 1.4 kw to 5.0 kw, averaging 4.2 kw. The average operation used 2.3 kwhr, required 40 minutes.

Characteristics of Electric Clothes Dryer Load

Number of Dryers in Test	41
Connected Load, Average per Dryer—kw	4.43
Persons per Family	4.20
Test Period	11/1/50-11/21/50
Demand Interval	15 Minute Integrated
Energy Consumption per Dryer—kwhr	
Estimated November Use (based on metered use ranging from 21 to 43 days which included the test period)	83.6
Estimated average annual use (based on metered kwhr use and seasonal variation indicated by Detroit Edison Co tests)	888
Maximum Coincident Demand per Dryer—kw	
Test Period	1.22
Average Monday	0.98
Average Weekday (Monday thru Friday)	0.42
Average of Individual Maximum Demands During Test Period	4.20
Group Annual Load Factors—Average Use of Test Group	
Based on Maximum Test Demand	8.3%
Based on Average Monday Maximum	10.3%
Diversity Factor—Based on Individual Maximum Demand and Maximum Coincident Demand During Test Period	3.44
Coincidence Factor	0.290
Average Individual Load Factor	
Based on Estimated Individual November Use	2.6%
Based on Annual Use of Test Group	2.4%

Annual Kwhr Use by Family Size

Persons per Family	Kwhr/Family	Kwhr/Person
1	417	417
2	386	193
3	670	223
4	964	241
5	900	180
6	920	153
7.7	1150	149


Average Per Customer Demand-Kw
Central warm-air systems
Time of maximum system peak to date
Average other uses
Unit heaters
Sun.,Jan. 12,1947 Degree days 27 Min temp 35 F
Mon.,Jan. 13, 1947 Degree days 31 Min temp 29 F
Tues.,Jan. 14,1947 Degree days 39 Min temp 23 F
Wed.,Jan. 15,1947 Degree days 37 Min temp 22 F
Thurs.,Jan. 16,1947 Degree days 33 Min temp 27 F
Fri.,Jan. 17, 1947 Degree days 33 Min temp 28 F
Sat.,Jan. 18, 1947 Degree days 27 Min temp 30 F

Average diversified half-hour demands; 48 electrically heated homes, 27 with unit heaters, 21 with central furnaces; a mild winter

Colder Winter Ups House Heating Load Factor

Greater use of energy in the hours after midnight and no increase in demand are the apparent effects of colder weather on electric house heating load according to W. L. Sharp, rate engineer, Portland General Electric Co.

This conclusion derives from a study made on a group of seven homes in Portland, Ore. Rather extensive tests had been made on house heating in the winters of 1945-'46-'47 (EW, Sept. 14, 1946 and May 22, 1948). These winters were comparatively mild. To see what change would result from colder weather, another test was run in January 1950.

The results obtained seem to confirm an assumption derived from the earlier study that a severe winter would tend to fill up the valleys in the load curve without unduly increasing the demand. This fact becomes evident by comparison of the chart at the top of this page with the "a" chart at the bottom. The top chart shows maximum demands of 9.1 and 10.6 kw, and peak responsibilities of 6.8 and 8.8 kw, for unit heater systems and central furnaces respectively. These figures compare with a maximum demand of 9 kw and a peak responsibility of 7.6 kw shown on Chart "a" for the seven houses in the later study.

With respect to demands and peak responsibilities, it is concluded that a properly designed unit heater system, in a house adequately insulated, will be little affected by the difference between 40 and 50 degree-days per day, representing a range in minimum temperature of roughly 25 and 10 deg F. The noticeable difference in heating load is the increase in energy use and the improvement in load factor with colder weather.

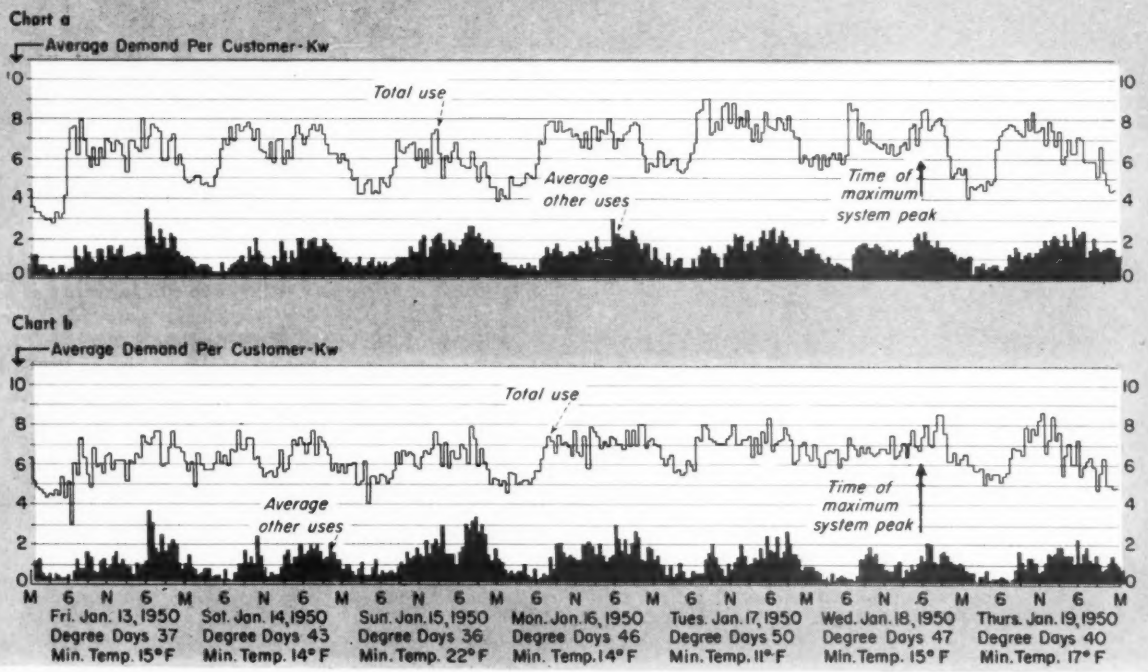
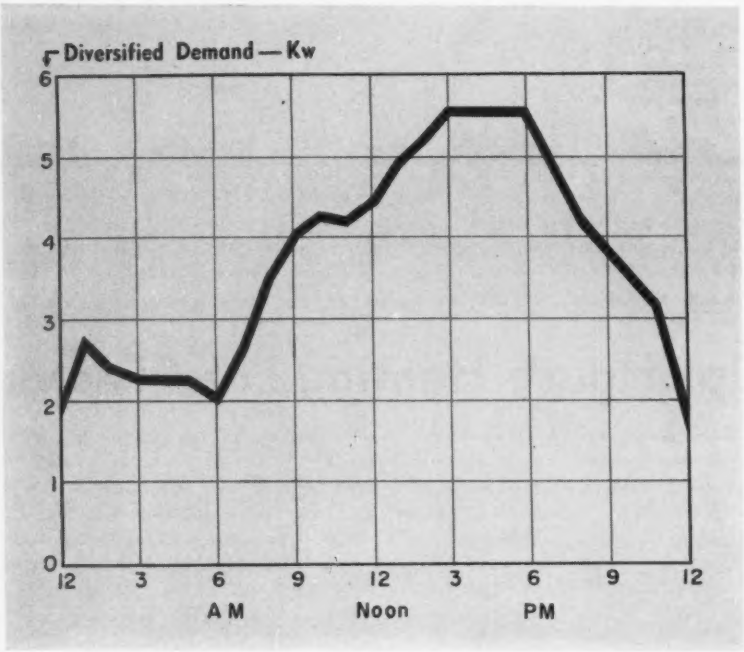
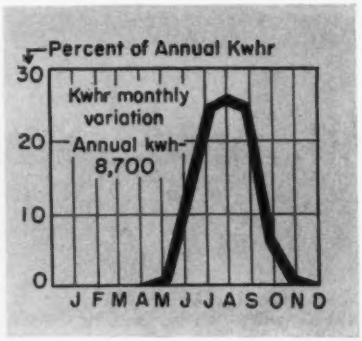


Chart a
Average Demand Per Customer-Kw
Total use
Average other uses
Time of maximum system peak
Chart b
Average Demand Per Customer-Kw
Total use
Average other uses
Time of maximum system peak
Fri. Jan. 13, 1950 Degree Days 37 Min. Temp. 15°F
Sat. Jan. 14, 1950 Degree Days 43 Min. Temp. 14° F
Sun. Jan. 15, 1950 Degree Days 36 Min. Temp. 22° F
Mon. Jan. 16, 1950 Degree Days 46 Min. Temp. 14° F
Tues. Jan. 17, 1950 Degree Days 50 Min. Temp. 11° F
Wed. Jan. 18, 1950 Degree Days 47 Min. Temp. 15° F
Thurs. Jan. 19, 1950 Degree Days 40 Min. Temp. 17° F

Apparent effect of colder weather is to increase energy usage after midnight without greatly affecting demand. Tests on 7 homes, 5 with unit heaters and 2 with central furnaces (Chart a) including 4 with load regulators (Chart b)

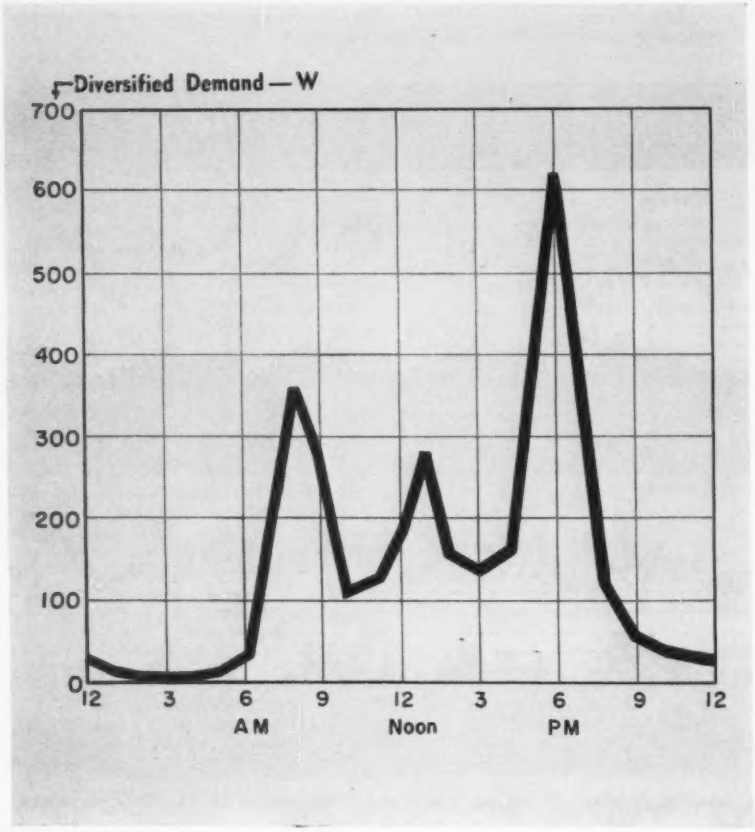
Dallas P&L Checks on Loads

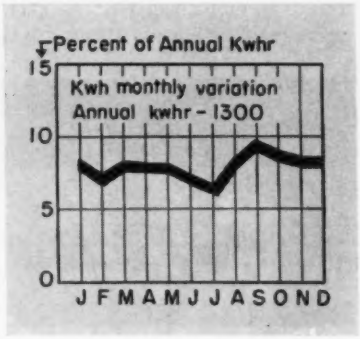




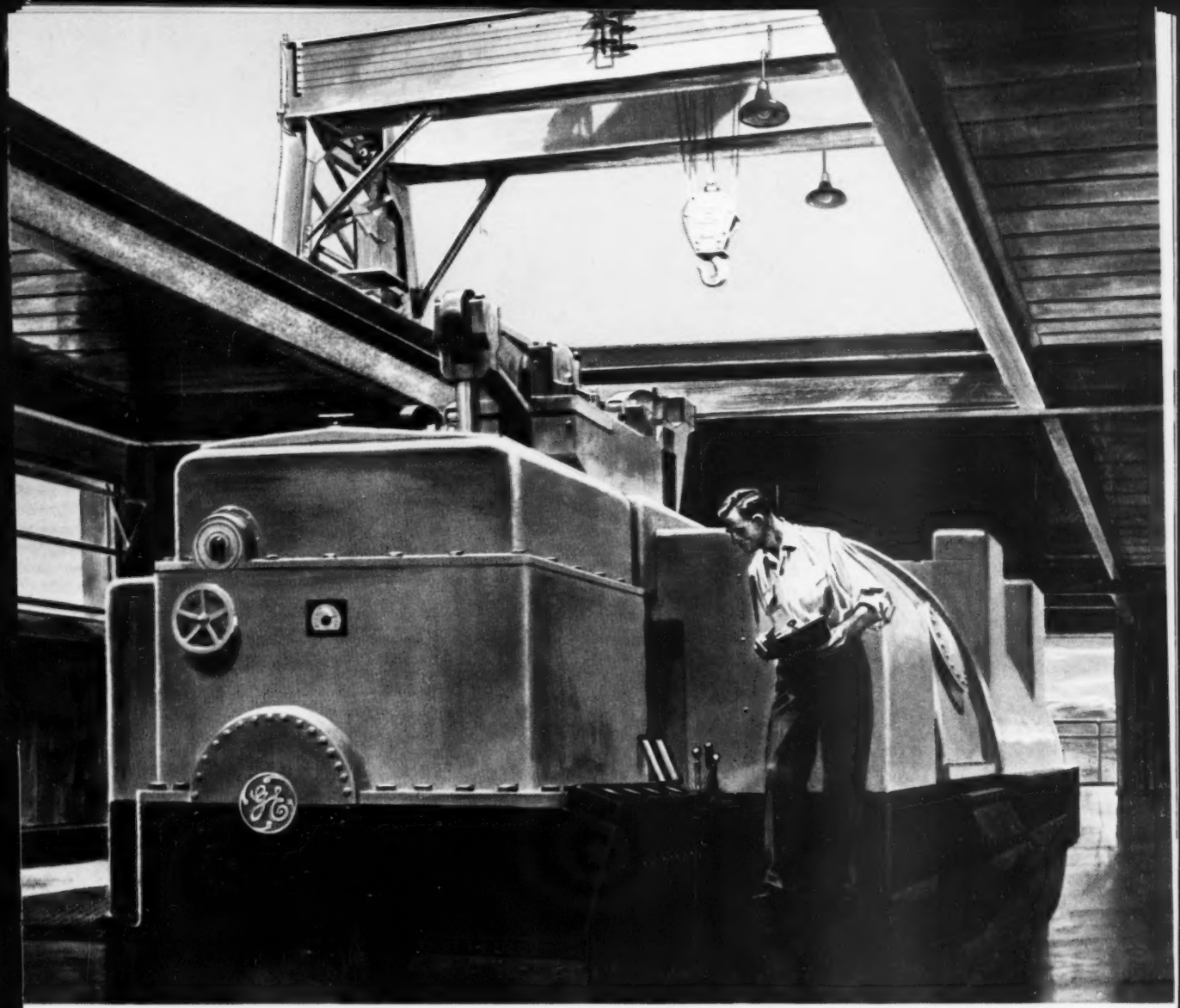
Residential air conditioning is becoming an important load in the South. Its definitely seasonal nature, as shown in the curve of variation of monthly kwhr usage, makes it something to be closely watched. DP&L put meters on 14 central air conditioning installations of over 2 hp and found that the diversified maximum demand held steady at 5.6 kw from 3 to 6 PM

↑ Residential Air Conditioning ↓ Electric Ranges





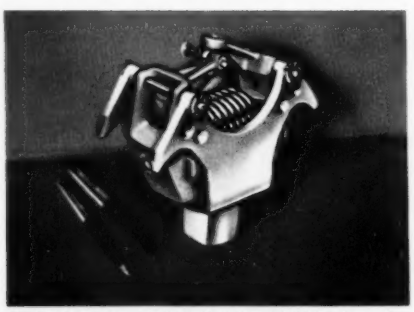
Of all load characteristics of heavy duty appliances, those of the range have received most study and are the best known, simply because the range is the oldest such appliance in use. But DP&L does not rely on what is generally known, makes a study on a small number of ranges to check data from other sources. This curve, covering 12 ranges, shows the diversified maximum demand peaking at 620 watts at 6 PM



STEARNS-ROGERS MANUFACTURING CO., ENGINEERS AND CONSTRUCTORS

At Public Service of New Mexico's New Person Station

GENERAL ELECTRIC TURBINE-GENERATOR PROVES REMARKABLE STABILITY OF MECHANICAL GOVERNING

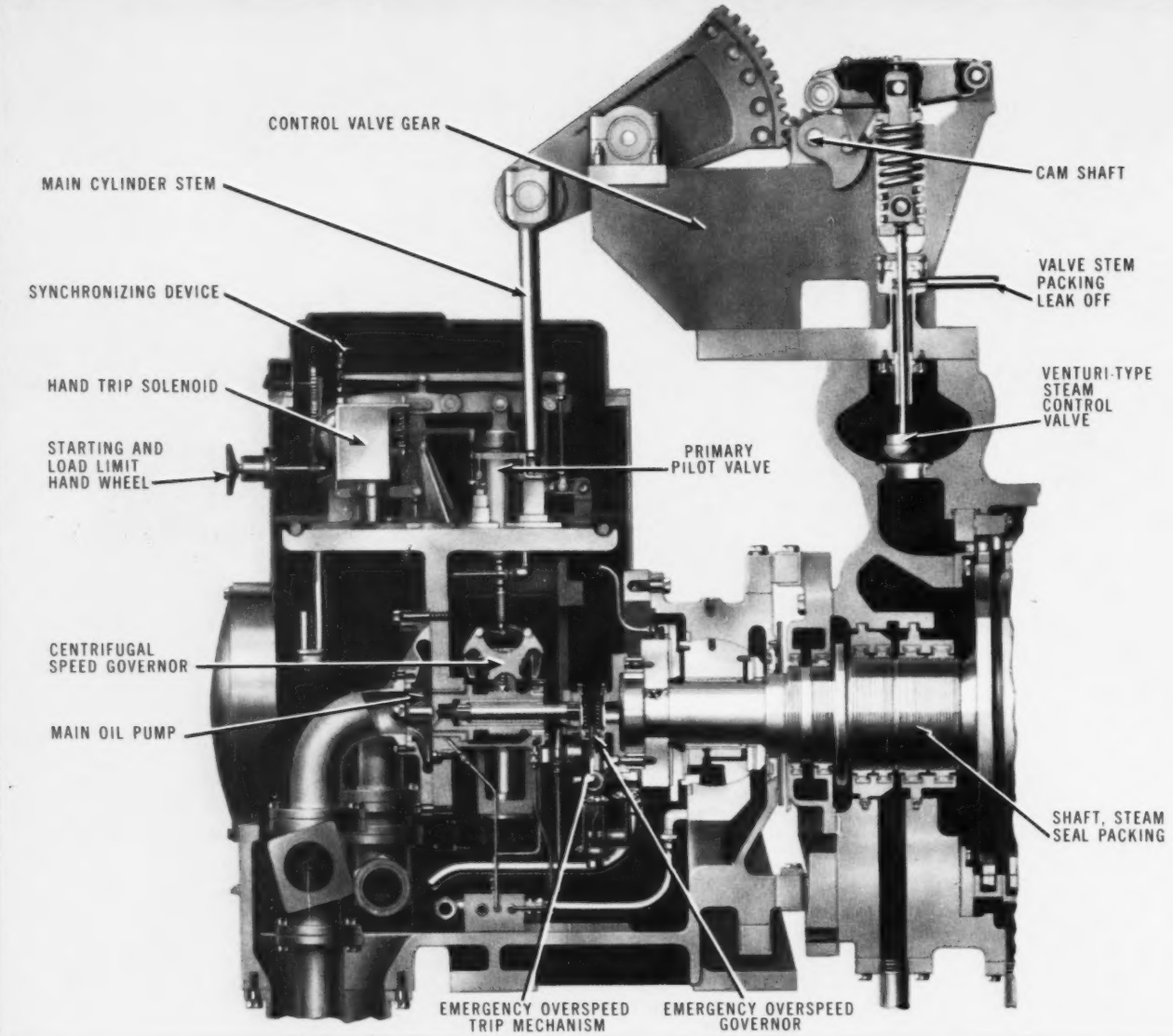


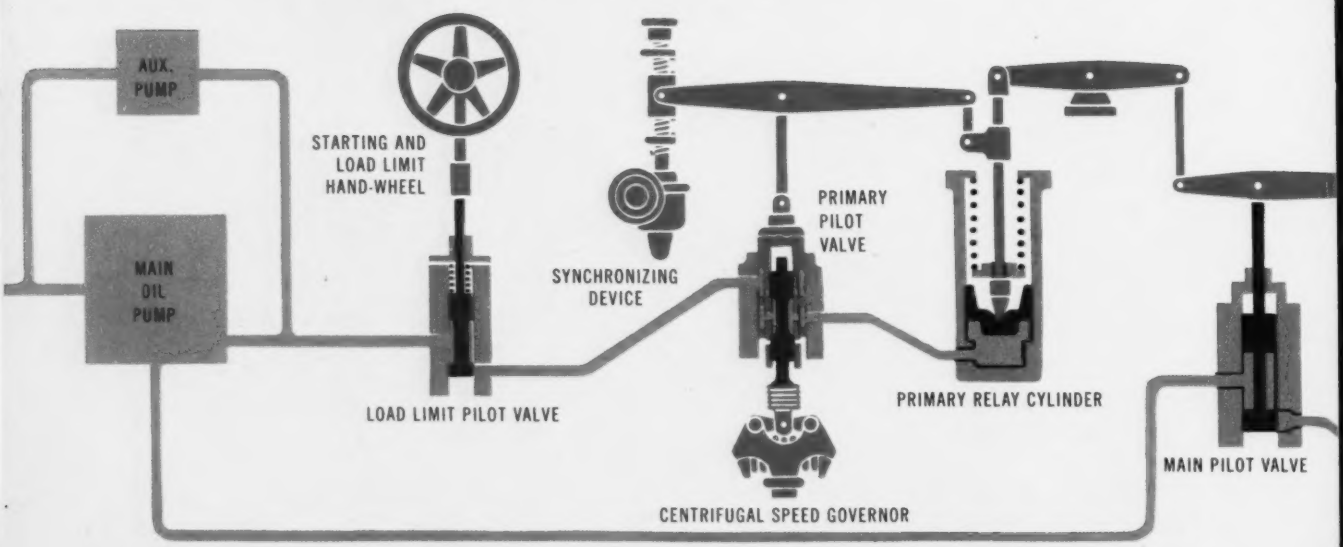
HEART OF THE REGULATING SYSTEM for the Person Station turbine is this small mechanical governor which controls pressure oil to operate the steam inlet valves.

To combine operating convenience with maximum accuracy and dependability, General Electric builds the same basic mechanical governing system into all turbine-generators from 2000 to 200,000 kw. On units like the new 20,000 kw machine at the Person Station of the Public Service Company of New Mexico, located at Albuquerque, turbine speed is actually held within 0.04% of initial setting.

GENERAL ELECTRIC

FOR DETAILS TURN TO FOLLOWING PAGES...





HOW THE TURBINE GOVERNOR OPERATES. During starting, the operator brings the turbine up to rated speed by turning the *handwheel.* The *main pump* supplies oil to the system through the *load limit pilot valve.* If the turbine tends to slow down with increased load, the *centrifugal speed governor,* gear driven from the turbine shaft, opens wider the *primary pilot valve.* This valve meters oil to the *primary relay cylinder* which simultaneously opens wider the *main pilot valve* through a mechanical linkage and restores the primary pilot valve bushing to a new position. Pressure is increased in the *main cylinder* which lifts the *valve gear* and allows more steam to enter. When the main cylinder is lifted, it restores

Mechanical Governing System Makes Rapid Response to Load Changes

"Easy to Start... Simple to Adjust" Report Operators at New Person Station

To keep pace with power demands which have nearly doubled in the last four years, Public Service of New Mexico recently put into operation its new semi-outdoor Person Station at Albuquerque. The first turbine on the line, a duplicate of which is now on order, is a General Electric 20,000 kw unit, governed by a standard G-E mechanical-hydraulic system.

Response to load changes is fast...so fast that the turbine speed will be held below trip speed even though full load is dropped from the generator instantaneously. Because the governor does no actual work other than to position a relay cylinder, accuracy is high. Safety and dependability are increased by the system's insensitivity to dirt or changes in oil viscosity.

Station operators find the governor ideal from their point of view. "The turbine is easy to start because the handwheel requires almost no pressure," reports one. "It's simple to adjust the settings—there's no lagging to pull off to reach the governing mechanism."

Despite its basic simplicity, the governor is flexible enough to meet a variety of system requirements. For instance, the turbine will "ride through" emergency conditions when operating personnel need to attend other equipment in the station.

Governing refinements are a major G-E contribution to power station efficiency—an additional assurance that General Electric offers more turbine for the utility's investment dollar.

Leader in Turbine Generator Progress

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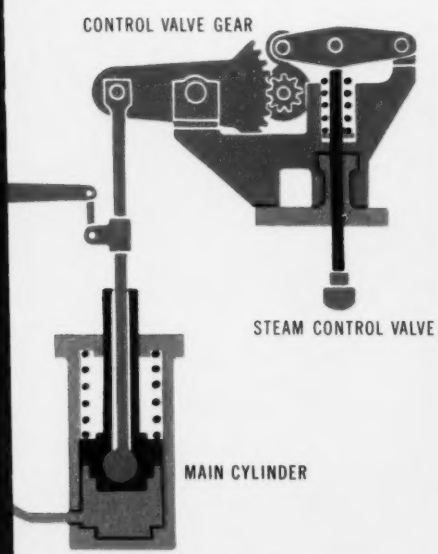
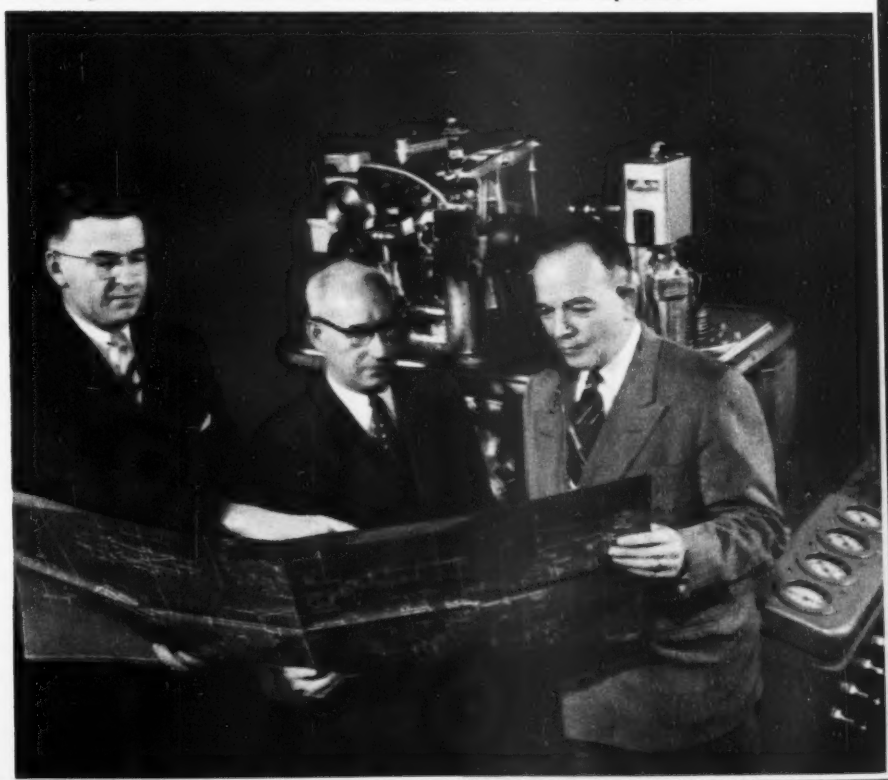
CROSS SECTION OF FRONT END of 20,000 kw General Electric turbine, showing mechanical-hydraulic governing system.



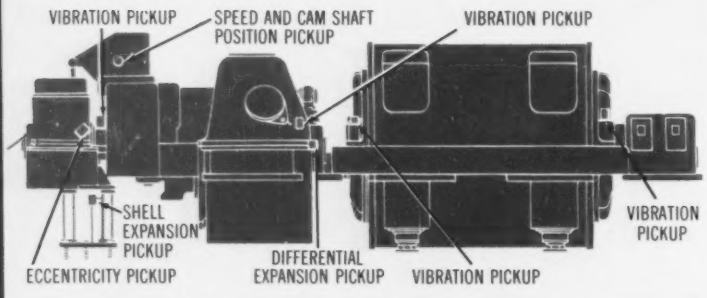
the main pilot valve to its controlling position and the system is in equilibrium at the new load. If the turbine tends to speed up on decreased load, the system operates in reverse.

GOVERNOR FEATURES are discussed by J. M. Baker, Governor and Control Engineer; A. D. Somes, Manager of Turbine Engineering; and L. D. Whitescarver, Manager of Marketing in G.E.'s Medium Steam Turbine, Generator & Gear Department.



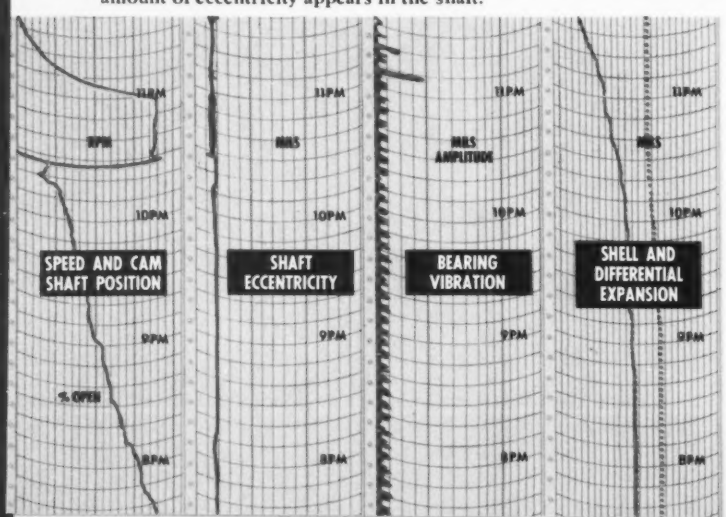
1876 75 1953 YEARS OF ELECTRICAL PROGRESS

SUPERVISORY INSTRUMENT PANEL houses all recorders and electronic power units connected to pickups on the turbine-generator.



LOCATION OF PICKUPS for supervisory instruments is shown on a typical 20,000 kw General Electric turbine-generator.

STRIP CHART RECORDS show a typical turbine's operation during reduction of load and shut down. From 7:30 p.m. to 9:45 p.m. while load is being decreased, shaft eccentricity and bearing vibration remain normal. Camshaft position recorder shows load dropping to about one-third of rating, and the differential expansion recorder indicates a slight decrease in forward clearance. When unit goes off the line about 10:30, speed indicator shows full speed until turbine is tripped out at 11:00. While the turbine is running at no load, a negligible amount of eccentricity appears in the shaft.



Supervisory Instruments Supplement Turbine Governing Accuracy

To provide accurate records of operation, as well as added protection for equipment, many electric utilities are now installing supervisory instruments with turbine-generators. This type of instrumentation is especially important in augmenting regular turbine governing on systems with centralized controls at remote points from the power generating equipment, or in stations following a practice of quick-starting their machines.

Speed and camshaft position recorders report changes in load as well as recording speed on start-up and shut-down. They also contribute to quick analysis of system disturbances which cause generator line breakers to open.

Shell and differential expansion recording equipment provide an index of operating clearances between rotating and stationary elements of the turbine-generator. Vibration and shaft eccentricity recorders detect immediately any hazards to smooth operation of the machine.

If you would like more information on turbine supervisory instruments, contact your G-E sales engineer. He will be glad to show you how they can fit into your planned system control. General Electric Company, Schenectady 5, N. Y. 256-1

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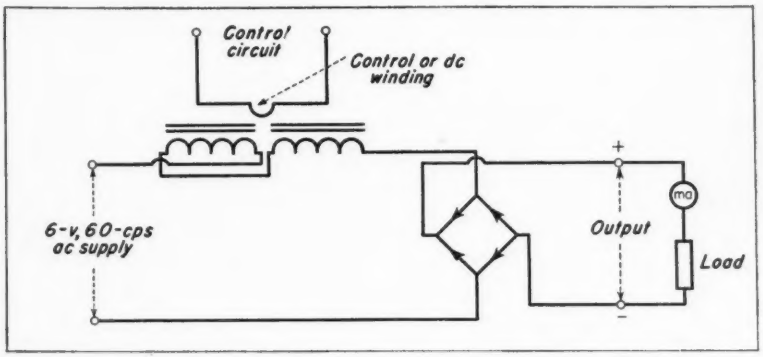
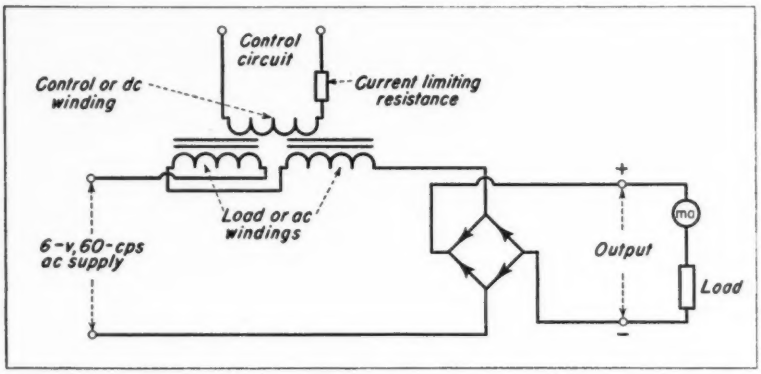


CURRENT MEASURING transductor control winding is connected to a 50- or 100-mv shunt, which provides excitation to saturate core and thus change the transductor's ac side impedance

TRANSDUCTOR resembles current transformer and is for dc metering applications



VOLTAGE MEASURING transductors have a resistance in series with the control winding to limit current to 10 ma maximum at rated voltage. Ac current is rectified for actual metering

Transductor Isolates Dc Metering

R. J. RADUS, Materials Division, Westinghouse Electric Corp, East Pittsburgh, Pa.

Isolation of dc metering and control circuits from other system components is provided by magnetic amplifier transductors. They are applied to dc systems that utilize currents in kiloamperes at potentials up to 3.3 kv in the same manner instrument transformers are used in ac circuits.

A transductor is a saturable reactor magnetic amplifier that operates as a controllable series impedance between an ac source and load. The reactor assembly may consist of two cores with individual ac or load windings and a common dc or control winding. The common dc winding provides means of controlling current in the ac circuit. Conversion of the ac load current to dc can be achieved with a bridge rectifier.

Magnetic coupling between load and control windings is responsible for the transductor's usefulness in isolating high bus potentials from metering circuits. When designed around high permeability, square-loop, core material, there is approximate equality of ampere-turns between control and load windings. Thus, the average value of output current is a linear function of the control current.

Two types of magnetic amplifier transductors are required. The type that is applicable to current measurement is built under two designs. One design operates with a 50-mv shunt and the other with a 100-mv shunt. The other type, for measuring voltage, operates with a current limiting resistance in series with the control winding. This resistance limits control current to approximately 10 ma.

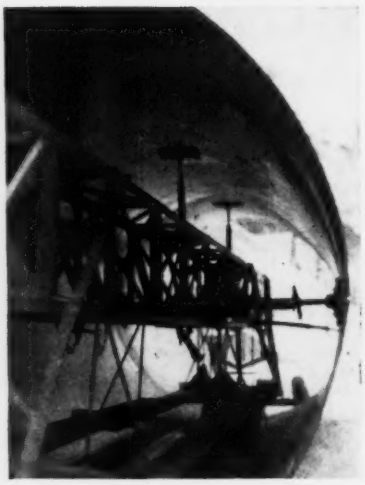
Output current remains relatively constant with changes in ac voltage and frequency, load resistance, and ambient temperature. The transductor maintains a relationship between the dc system and metering circuit that deviates from true linearity by $\pm 0.25\%$ of full scale output.

Buggy Carries Steel Liners into Hydro Tunnel

Transporting steel liners into a 5,892-ft tunnel that varied in cross section was accomplished by a special carrying buggy designed and built by Los Angeles Dept of Water and Power. Use of buggy permitted changing shape of 104-in. ID liners, without damaging them or their bitumastic coatings, to negotiate tunnel which was about 105 in. wide at narrowest points.

The tunnel, which was drilled in 1917, varied in width because part was concrete lined in 1926 and the remainder in 1936, resulting in two different cross sections. It has not been used as a pressure tunnel. In 1952 it was decided that the tunnel should be waterproofed to seal off leakage so it could serve as a pressure tunnel. Sections of steel liner, ¼-in. thick, 30-ft

LINER BUGGY is made from welded steel beams and is about 32 ft long. Rubber tires are set at an angle to conform to the tunnel floor. Buggy was pushed by a modified jeep



HAND-OPERATED JACKS support and warp liner permitting passage thru small section

long, 104-in. ID, were chosen. In all, 163 sections, each weighing about 17,300 lb, were carried an average distance of over a half mile into tunnel.

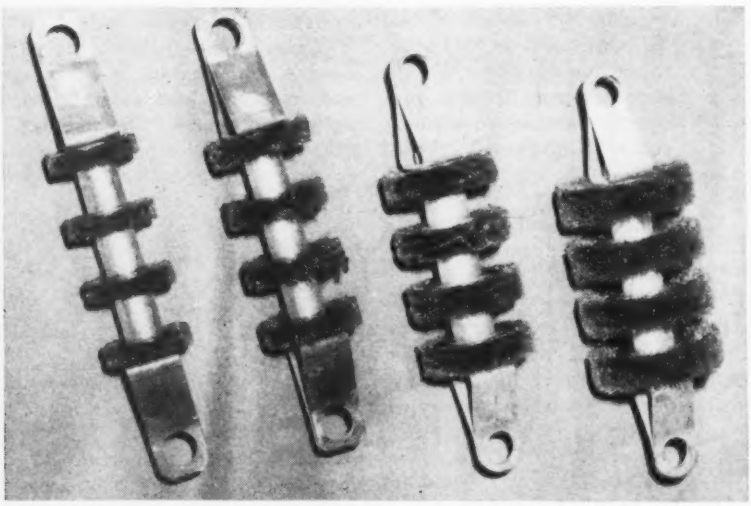
To transport liners, buggy was designed and built at tunnel mouth. It consists of a transverse, lattice-steel beam about 32 ft long made of angle iron welded together. Angle-iron A-frames and diagonal bracing at each end rest on axle assemblies. Rubber pneumatic tires set at an angle to conform to tunnel floor help keep buggy over vertical center of tunnel. Steering wheel assembly at one end of buggy was operated by workman to steer vehicle. Headlights at steering end provided illumination ahead of buggy in addition to fixed lights in tunnel.

After liner had been lifted off trailer-truck by crane, buggy was pushed through it. Three hand-operated jacks along top of transverse beam and two along each side were tightened against curved steel plates to support liner. At point where tunnel cross section changed, jacks were operated to warp liner shape to allow passage. Wooden platform underslung from transverse beam provided a convenient place to stand for workmen who rode along to operate jacks.

Buggy and liner were pushed by a jeep especially modified for that purpose. Speeds of up to 15 mph underground were attained with loaded buggy.

When liner was delivered to its location, jacks were backed off, the buggy was pulled through and out of tunnel. Liners were set on blocks, jacked into position, welded to preceeding section and pressure grouted. During installation, liners were carried into tunnel at rate of eight per day. This was not the maximum number that could have been carried but was sufficient to keep up with progress of welders.

Wire Brush Swabs Clean Ducts and Prevents Cable Damage

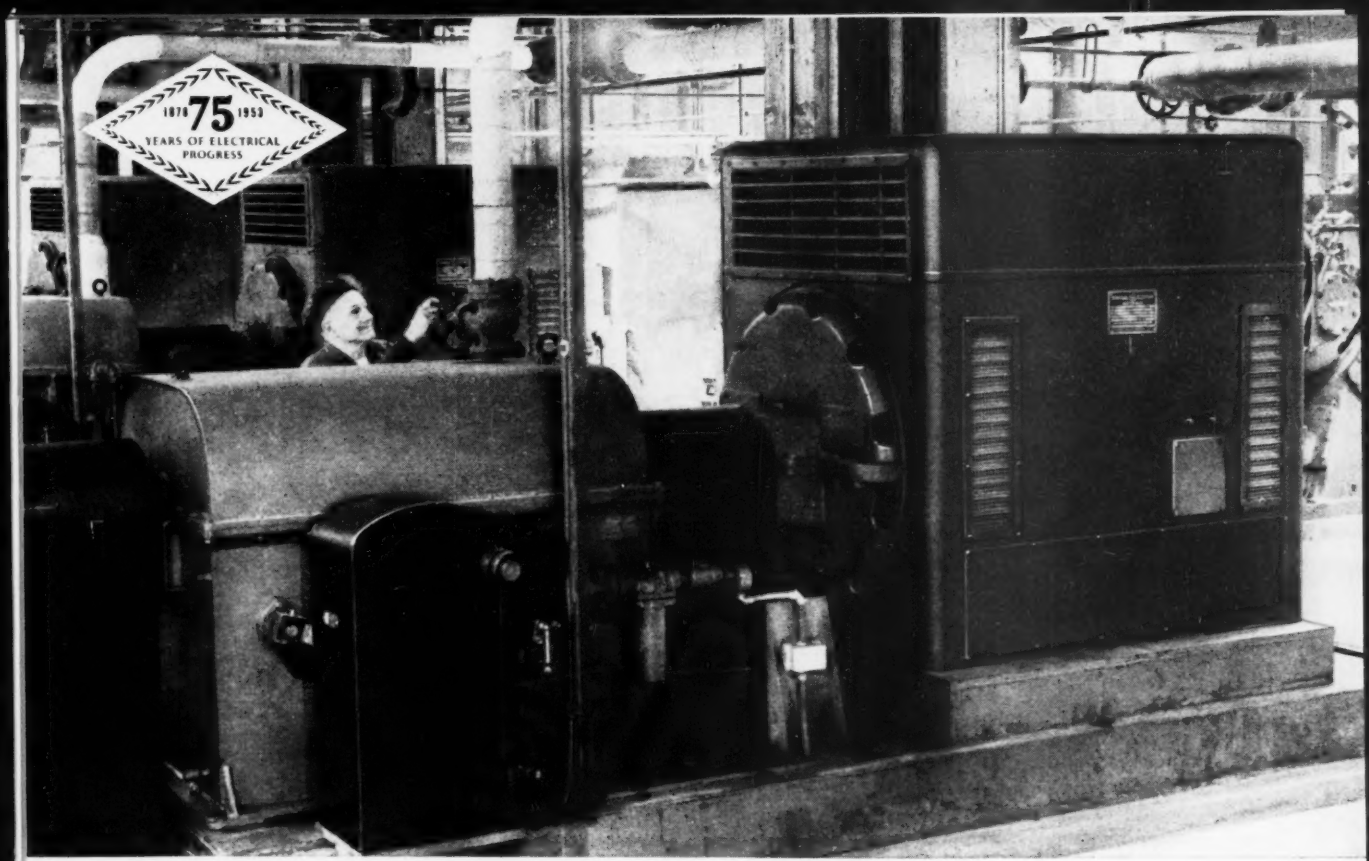


DUCT SWABS made from wire brush buffing wheels clean ducts better than cotton waste swabs used previously. Four sizes are used, 3 in., 3½ in., 4 in., and 5 in.

C. A. STEELE, Engineer, Electrical Construction Department, Shops and Tools Service, Commonwealth Edison Company, Chicago, Ill.

Small stones, pieces of cement and other foreign material that might damage the lead sheath of a cable are removed from ducts by pulling wire brush duct swabs through the duct before pulling in cable.

Commonwealth Edison's underground group of the Electrical Construction Department devised these swabs from wire brush buffing wheels. They perform better than the old swabs made by stuffing cable grips with cotton waste and they last longer than the cotton waste swabs. Four sizes of wire brush swabs are used in construction—3 in., 3½ in., 4 in., and 5 in. in diameter.



MODERN G-E BOILER FEED PUMP MOTORS ARE INSTALLED IN NIAGARA MOHAWK'S NEW ALBANY POWER STATION.

IN DESIGN AND PERFORMANCE—

A True Power Station Motor

When side-air-discharge motor ventilation proved impractical for large boiler fed pump service, we reversed the air flow to expel the warm ventilating air high over the pump. This prevents recirculation of discharge air . . . permits close parallel spacing of motors . . . greatly improves personnel comfort.

In addition to ventilation changes, this modern cubical boiler feed pump motor incorporates the latest advances in bearings, insulation, rotor, and stator design. It's built to serve you with the year 'round reliability the vital power industry requires.

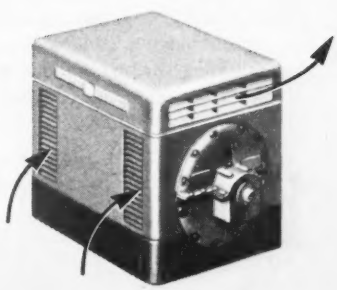
Some of the features of the G-E drip-proof Boiler Feed Pump Motor which make it a true power station motor from top to bottom are:

STREAMLINED ROTOR construction prevents "siren" effect—built-in deflectors and large discharge chamber cut overall noise level considerably.

DUAL LUBRICATION SYSTEM combines the advantages of force-flood lubrication and self-lubricated oil rings . . . gives extra protection . . . assures long, reliable bearing life.

COMPLETE 360 DEGREE ENDSHIELD supports bearing from top as well as bottom . . . assures continuous, accurate bearing lineup. Both endshield halves are sturdy ribbed castings.

For more information contact your nearest G.E. Apparatus Sales Office or write for Bulletin GEA-5813 to General Electric Co., Section 753-3, Schenectady 5, N. Y.



Conventional motor (top) expels heated discharge air into the aisle—G-E Boiler Feed Pump motor exhausts air high over the pump.

You can put your confidence in—

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Motor Reactance for Duty Calculations of 600-v Circuit Breakers and Buses

Useful data are compiled for determining the effect of feed-back from squirrel-cage motors under fault conditions on industrial plant systems and on generating station service facilities feeding station auxiliaries. Characteristics are included for motors up to 2300 v

FRANK E. REEVES,* Electrical Engineer, Los Angeles, California

Feed-back under fault conditions is considered for the following purposes:

1. To determine the interrupting capacities of circuit breakers rated 600 volts or less.

2. To determine the mechanical stress and momentary duty ratings of circuit breakers in general.

3. For the design of buses and the selection of adequate bus supports.

Effect of feed-back may usually be neglected under the following conditions:

1. If the feed-back power must feed through one or more transformers or current limiting reactors.

2. For the determination of interrupting capacities of circuit breakers rated 2300 v or higher.

3. For calculations involving fault currents after the first 2 cycles. (The feed-back effect usually becomes negligible 2 cycles after the first appearance of the fault.)

4. After interruption of the power source. (Since induction motors have no means of self-excitation.)

Wound-rotor motors having a considerable amount of external resistance connected in their secondaries will have a negligible feed-back effect.

Accompanying table will assist in determining the magnitudes of feed-backs from induction motors under system fault conditions.

* Book publication rights reserved by author.

Percent Reactance and Estimating Values of Kw, Power Factor and Kva for 3-phase Squirrel-cage Induction Motors

HP	KW	PF, %	KVA	Percent Reactance A	B	C	HP	KW	PF, %	KVA	Percent Reactance A	B	C
220, 440 and 550 V													
0.5	0.53	72	0.735	4250	5100	5500	25	21	85	24.7	125	150	160
1	0.90	83	1.08	2880	3450	3700	30	25	88	28.4	110	130	140
1.5	1.40	84	1.67	1880	2250	2400	40	34	89	38	83	99	106
2	1.80	86	2.1	1500	1800	1900	50	42	88	48	65	78	83
3	2.65	87	3.05	1010	1220	1300	60	50	88	57	55	66	70
5	4.4	84	5.25	600	720	770	75	62	86	72	44	53	56
7.5	6.35	86	7.4	425	510	550	100	81	86	94	34	41	43
10	8.7	87	10	313	375	400	125	100	88	114	28	33	35
15	13	90	14.5	212	255	270	150	122	87	140	23	27	29
20	16.6	90	18.5	170	200	220	200	163	85	192	16	20	21
2300 V													
25	20	81	24.7	—	150	160	75	62	85	73	—	51	54
30	24	85	28.2	—	130	140	100	83	90	92	—	40	43
40	35	85	41.2	—	92	98	125	102	90	118	—	32	34
50	43	85	50.5	—	75	80	150	122	86	142	—	27	29
60	51	85	60	—	63	66	200	164	85	195	—	20	21

NOTES

All reactances are on a 100-kva base. To refer to 1,000-kva base, multiply values by 10; for 10,000-kva base, multiply by 100, etc.

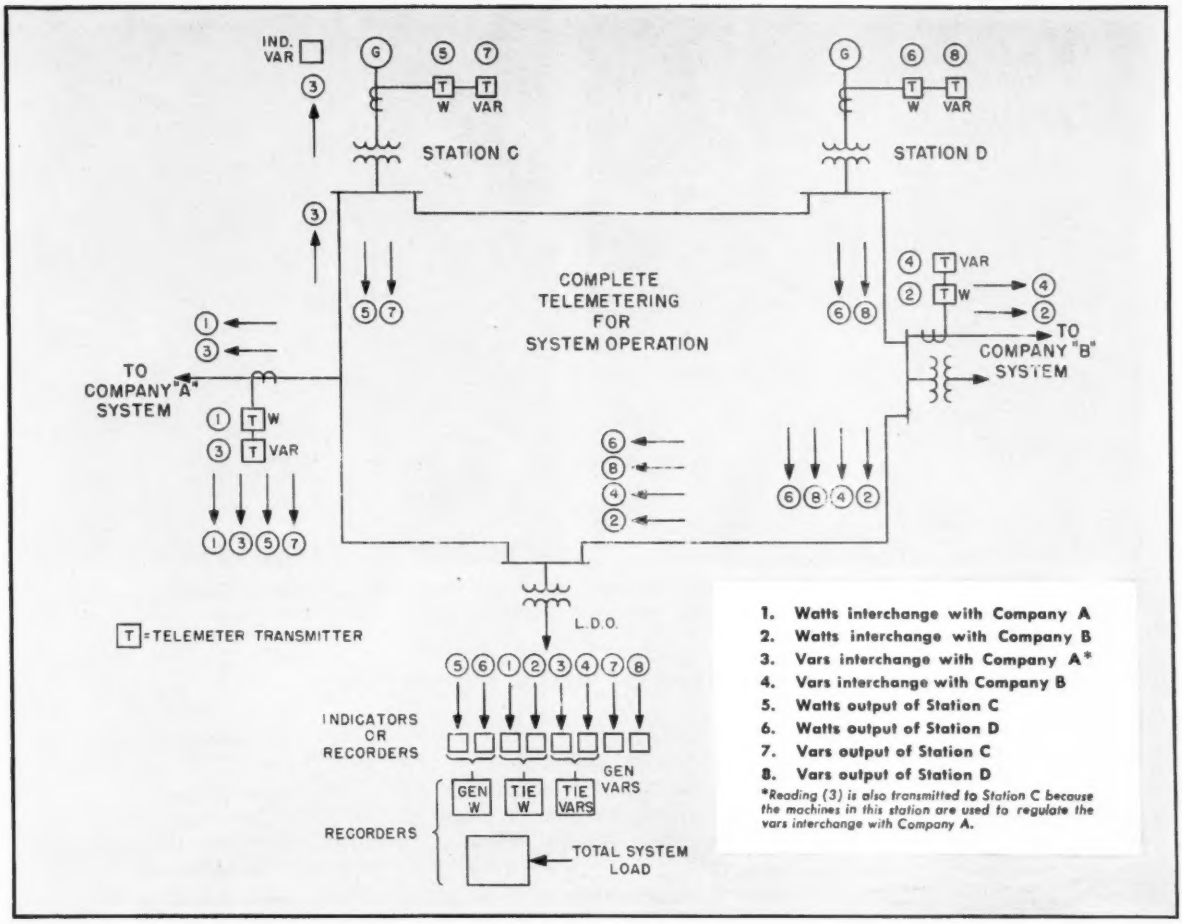
Use column A for determinations of interrupting duties of circuit breakers rated 600 v or less.

Use column B for calculations of momentary duties of circuit breakers, and mechanical stresses of circuit breakers and buses, provided current is not fed predominantly by directly connected synchronous generators, with or without series current limiting reactors.

Use column C for all other calculations.

These listed reactances were determined by using an average value of subtransient reactance for induction motors of 25%. Column A includes a multiplying factor of 1.25; column B, 1.5; and column C, 1.6.

Values of reactance for small motors are extremely high, indicating that such motors would contribute very little to the system fault currents. Where to draw the line on size must, of course, be determined by the number of motors and other conditions peculiar to the particular system.


IND. VAR
G
5 7
T W T VAR
STATION C
G
6 8
T W T VAR
STATION D
COMPLETE TELEMETERING FOR SYSTEM OPERATION
4 T VAR
2 T W
TO COMPANY "B" SYSTEM
TO COMPANY "A" SYSTEM
1 T W
3 T VAR
1 3 5 7
6 8 4 2
6 8 4 2
T = TELEMETER TRANSMITTER
L.D.O.
5 6 1 2 3 4 7 8
INDICATORS OR RECORDERS
GEN VARS
GEN W
TIE W
TIE VARS
RECORDERS
TOTAL SYSTEM LOAD
1. Watts interchange with Company A
2. Watts interchange with Company B
3. Vars interchange with Company A*
4. Vars interchange with Company B
5. Watts output of Station C
6. Watts output of Station D
7. Vars output of Station C
8. Vars output of Station D
*Reading (3) is also transmitted to Station C because the machines in this station are used to regulate the vars interchange with Company A.

G-E Telemetering Provides Immediate Check of Entire Power Generating System

Above is a complete telemetering network for one generating system. The diagram shows how this network instantly supplies system load dispatches with eight essential checks on power generation.

Only continuous, system-wide telemetering can bring you all of these essential readings: active and reactive power in the tie lines and other key points, generating station power and reactive power, loading of critical tie lines, and net power interchange.

G-E telemetering equipment is available for carrier-current channels, microwave channels and wire-line channels. You are assured of a completely co-ordinated system because all the equipment is designed, manufactured, sold, and serviced by only one company.

FAST RECORDER RESPONSE is available from the G-E telemetering system. With any nominal two-second electronic recorder, the response time is less than two seconds for 90 percent of full scale. Accurate indications or records of even rapidly fluctuating voltages or loads can be obtained.

Also, because indicating milliammeters can be used when a record is not needed, the expense of charts and maintenance of narrow or wide chart recorders is limited to those places where recording is essential.

LOW INITIAL COST is incurred with the G-E carrier-current system. Only 11 under-rated tubes (not including the recorder) are used, compared with more than 30 tubes, without recorder, in other systems. This means less initial cost and maintenance without sacrifice in accuracy or reliability.

MORE INFORMATION is available about G-E telemetering systems. Contact your nearest G-E apparatus sales office, or write for Bulletin GEA-5746, General Electric Co., Section 605-38, Schenectady 5, N. Y.

You can put your confidence in—

GENERAL ELECTRIC

STEEP SLOPE between substation and Osage Plant posed cable support problem to prevent migration and cold flow of oil-base insulation

CONCRETE ENVELOPE provides both longitudinal and vertical support for cables, which are used to control a new substation on hill top

Concrete Envelope Prevents Cable Migration

BARRETT M. CAROTHERS, Electrical Engineer, Union Electric Co of Missouri, St. Louis

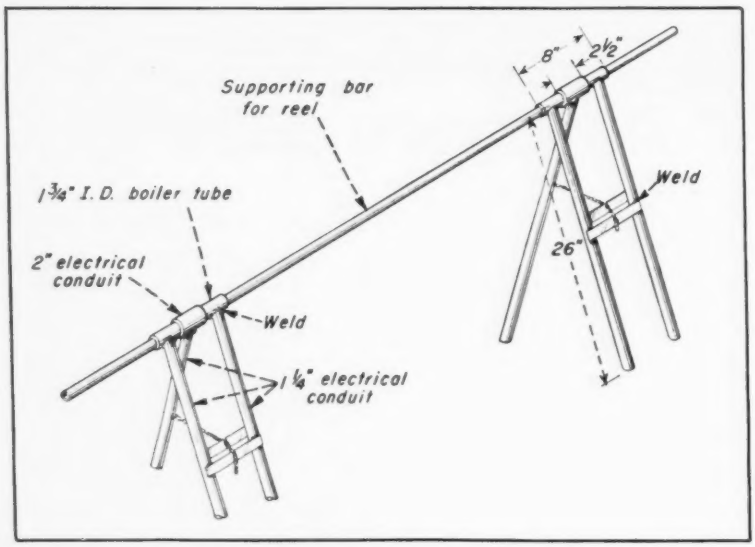
Installation of control and metering cables in a concrete envelope on a steep slope provided Union Electric Co of Missouri with a means to prevent migration and localized strains. This construction was a result of studies which followed migration of power cable conductors on the same slope.

The ten cables extend from a new 138-kv substation on the hill top to Osage Plant in the valley and are used to control the substation. Part of the 2,500-ft route is a steep stable slope. There is a 225-ft elevation change in 420 ft. Over this portion of the route it was necessary to encase the cables in concrete to provide continuous vertical and longitudinal support.

Piers were cast on 10-ft centers with footings keyed into rock where possible. Spread type footings were used where rock was covered to considerable depths. Precast slabs were lowered onto keyways and anchor bolts, and allowance was made for ½-in. expansion joints of elastic fill at each pier.

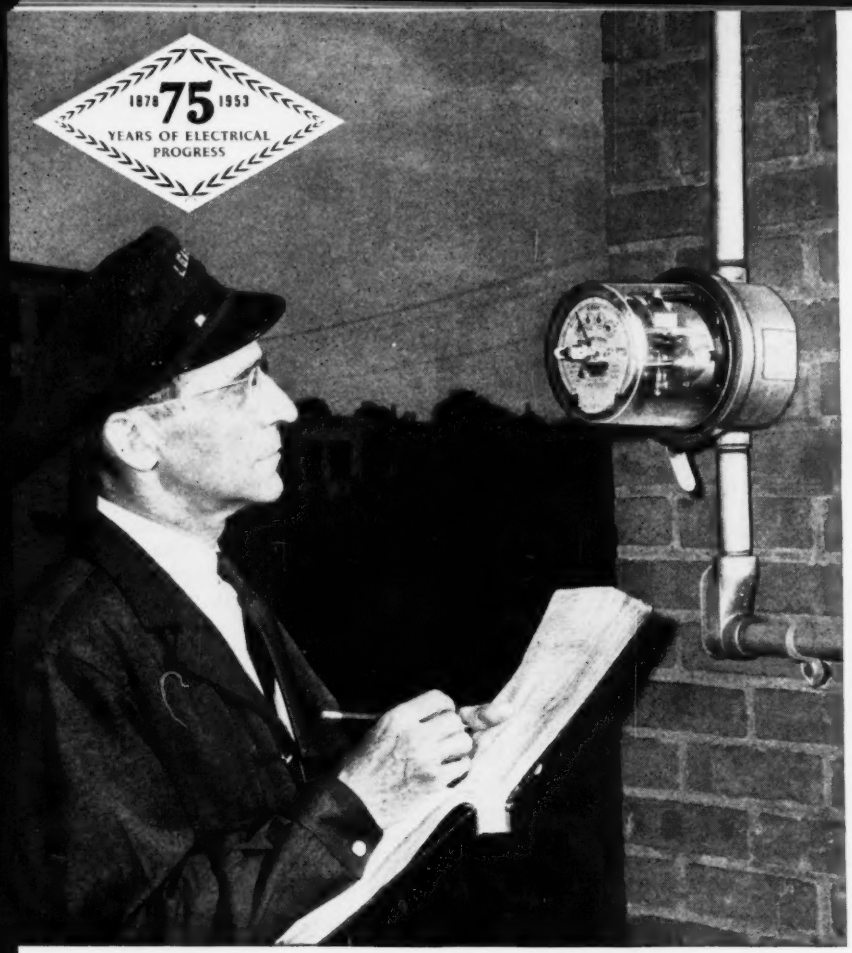
Cables were then lowered into place and formed with concrete spacer blocks to assure maximum bonding of concrete to cables. Three ft of asphalt impregnated paper was wrapped around cables at expansion joints to prevent local conductor strains during contraction and expansion. Reinforcing steel was set, side forms placed and the concrete envelope was poured.

Since cable failure in the envelope will require abandonment of that section, one spare of each type was provided.



Reliable Reel Rack

Decreased setting-up time and reduced chance of overturning are features of this reel stand design utilizing three-legged supports. Welded joints have replaced threaded fittings, formerly used in such stands, thereby increasing the strength of the stand.—**C. F. Morris, Weymouth Light & Power Co, Weymouth, Mass.**



IM-50 METERS are available for socket (left) or front (above) connections, with variations up to 10% of rated meter voltage permissible.

I-50 FEATURES such as magnetic suspension, die-cast frame, and molded insulation provide sustained accuracy and reliable performance.

IM-50 Meters Give Accurate, Low-Cost Demand Measurement

Moderate price and low installation cost make the General Electric IM-50 watthour demand meter the type best suited for measuring demand of small industrial and commercial power users.

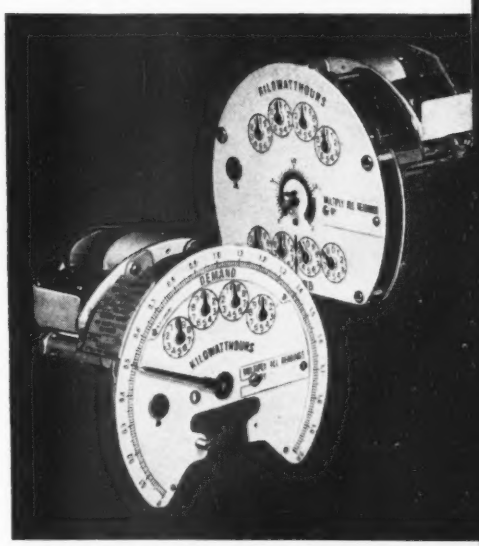
The watthour meter is the well-known Type I-50, having such benefits as magnetic suspension (no meter-bearing wear), lightning protection, and sustained calibration—which combine to give accurate and reliable performance with little maintenance. The demand register is a mechanical block-interval type—either indicating (M-30) or cumulative (M-31).

QUICK, EASY RESETTING—The reset mechanism is simple and readily resealed, requires only one hole in the glass cover, and is corrosion-resistant to prevent sticking with rust.

Interval resetting is positive and precise, with no impact upon returning to zero. This minimizes wear and the possible necessity for occasional readjustment.

ADJUSTMENTS MINIMIZED—The register has few adjustments, all accessible and easy to make. Freedom from wear, together with high factors of safety, reduces any subsequent readjustment to the minimum.

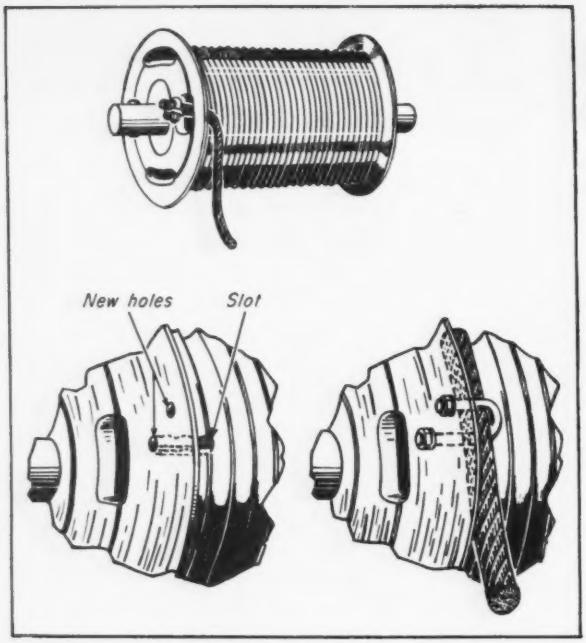
For more information, contact your G-E representative or write Section 601-93, General Electric, Schenectady 5, N. Y.



INDICATING OR CUMULATIVE REGISTER is used. Either can be purchased separately for use on watthour meters that are now in service.

You can put your confidence in—

GENERAL ELECTRIC



CABLE ATTACHMENT on drum (top, old method) (bottom, new method) has two holes and a slot cut in the drum for legs of a U-bolt

Drum Fastener Reduces Cable Renewal Time

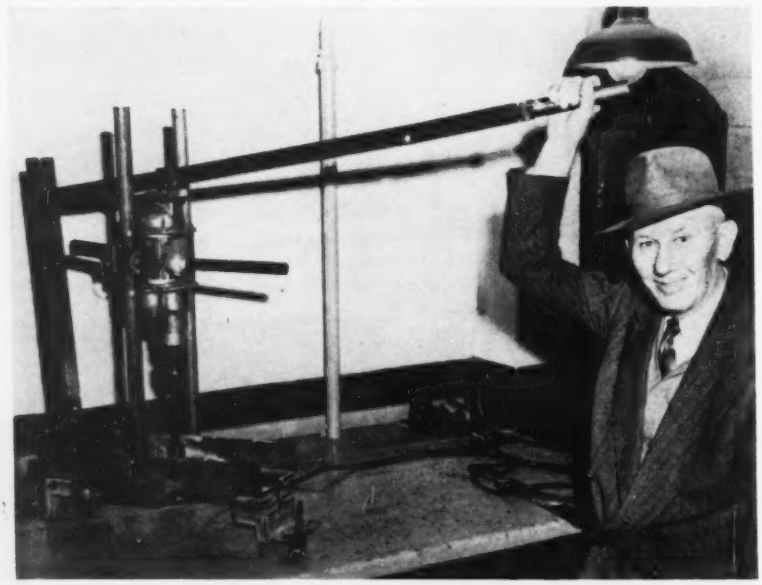
H. P. BROWN
L. P. SCALES, Coal Conveyor Dept, The Ohio Power Co, Philo, Ohio

The cable-to-drum attachment as shown in an accompanying sketch is now being used in cable renewals on the closing-line drum of gantry cranes. The job of fastening the end of the cable to the drum has been shortened and made safer; skinned knuckles and lost tempers have been avoided.

With the old method, the end of the cable had to be bent on a short radius to get it through and outside the drum for application of the cable clamp. With the new attachment, the end of the cable is merely passed straight through the recessed U-bolt which allows the cable end to lie flush in the drum groove.

This modification has proved so successful in eliminating the disagreeable part of cable renewals on the closing-line drum that similar drums on the gantry cranes and yard equipment will be changed when the drums are removed for maintenance.

Motorized Rotary Drill Saves 95% Time in Drilling Concrete



MOTOR-DRIVEN DRILL proved economical for drilling 12 holes in 12-in. concrete on top of cell structures for six oil circuit breakers and eliminates need for star drill and hammer

Adaptation of an electric motor and a rotary drill saved 18 man-days in drilling 12 holes in 12 in. of concrete. The holes were needed in top of a cell structure in which six new oil circuit breakers were installed as part of a modernization program at the Highlandtown, Md., substation of Pennsylvania Water & Power Co.

With the rotary drill equipment each hole was drilled in approximately 25 min and the job was completed in less than a day of actual drilling time. In addition the method is safer than the star drill-and-hammer method. The latter method would have required about 20 man-days, with the danger of cracking the concrete always present.

The vertically mounted drill equipment was developed by James Byers, Plant Mechanic Specialist, of Penn Water's Maintenance Department at Highlandtown, Md. It has a channel iron base with a hole in the center through which the rotary drill operates and two pipe uprights welded, one on each side. At one end of the channel is a ladder-like adjustable leverage rest.

Welded on each side of the drill motor are two larger pipe ends which fit over the uprights on the base. This arrangement holds the motor in position and permits it to slide up and down.

On top of the motor rests a pressure arm having a total length of 48 in. One end of this lever fits into the leverage rest at the desired height; other end is the handle.

Operation of the motorized rotary drill is simple; only one man is needed to put the base in place, fit the motor over it, install the rotary drill and pull down on the arm.

For the concrete drilling the manufacturer's directions suggested the use

(*Continued on page* 180)

Don't Forget to SPECIFY REVERE

CONDENSER TUBES AND PLATES

Year after year users of condenser tubes and plates specify Revere, not only for new equipment, but when re-tubing. You might consider this fact if you are not as yet a Revere customer.

Correct specification is vitally important, because conditions vary so greatly. Each installation presents an individual combination of factors, each one of which should be studied before deciding on the proper alloy. It is often advisable to make a new survey of the situation before re-tubing, because the nature of the cooling water may have changed, or other service alterations have taken place.

To find the alloy or combination of alloys best suited to meet a specific set of circumstances, Revere offers the help of its Research Department, made available through the Technical Advisory Service. Working with the country's leading users of condensers and heat exchangers, these capable consultants have helped solve many and varied types of problems, leading to longer tube life.

Revere makes tubes and tube sheets in all the customary alloys. See the nearest Sales Office.

REVERE

COPPER AND BRASS INCORPORATED

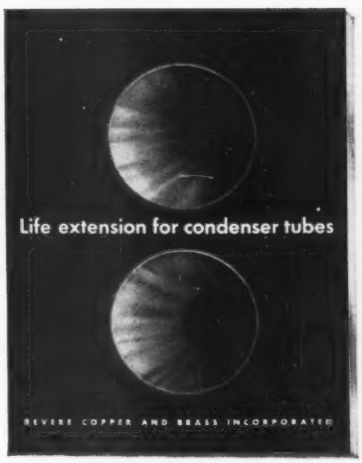
Founded by Paul Revere in 1801

230 Park Avenue, New York 17, N. Y.

Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y. Sales Offices in Principal Cities, Distributors Everywhere.

SEE REVERE'S "MEET THE PRESS" ON NBC TELEVISION, SUNDAYS

This 28-page booklet is of unusual interest in these times when it is more important than ever to squeeze every last day of use out of condenser and heat exchanger tubes. It includes data on various copper alloys, photos of different types of condenser tube corrosion, and photomicrographs of the grain structure of different metals under varying operating conditions. Write on your firm's letterhead for your free copy. Ask for "Life Extension for Condenser Tubes."



A Purchasing Agent for a Utility ASKS —

"Is it possible to determine by visual inspection whether or not an insulator is okay?"

HERE'S OUR

Absolutely Not! Visual inspection alone cannot determine whether an insulator is fit for electrical service. Visual inspection does play an important part in the manufacture of Pinco Insulators in determining dimensional accuracy and physical appearance. However, it is necessary to subject *every* insulator to routine electrical and mechanical tests to be absolutely certain that the insulators we ship will more than meet the electrical and mechanical loads they will be subjected to in service.

It is because of Pinco's strict adherence to quality and production control methods *plus* rugged mechanical and electrical tests that Pinco Insulators have given top performance for more than 30 years.

That's why we say—*it pays to put up Pinco!* They're RIGHT *for* the job . . . always RIGHT *on* the job!

P.S. *Like further proof of Pinco's service records covering all types of Insulators? Drop us a line . . . or ask your Joslyn salesman.*

The Porcelain Insulator Corporation LIMA, N.Y.

Suspension Insulators . . . Clamps and Fittings . . . Switch and Bus Insulators . . . Distribution and High Voltage Pin Types . . . Guy and Tree Insulators . . . Special Porcelain.

NO. 12 IN A SERIES

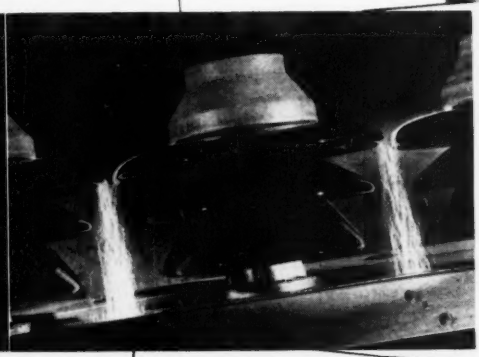
STRENGTH TEST . . . After Assembly, each Pinco Unit is given a routine strength test in an automatic machine before the final electrical test. Shown are Pinco 1070 Suspension Insulators with 15,000 lb. mechanical rating undergoing this test.

ANSWER

EVERY PINCO INSULATOR MUST PASS THESE GRUELLING TESTS OR BE REJECTED . . .

60 CYCLE FLASHOVER TEST . . . Following routine mechanical tests, insulators are given a final 60 cycle flashover test. These Pinco 1060 Suspension Units must stand up under maximum flashover voltage for 5 minutes to prove they can perform 100% under unusual electrical line surges.

160,000 VOLTS are applied to these Pinco 735 Switch and Bus Units in the final 60 cycle test. Each part of this insulator has also been tested electrically before assembly.



In addition to these routine mechanical and electrical tests, Pinco Insulators selected at random are subjected to the standard E.E.I. Nema design tests. It is precise quality and production control methods such as these, from clay to finished product, which insure Pinco "RIGHT ON THE JOB" service . . . points well worth remembering when you specify and purchase insulators.

HIGH FREQUENCY FLASHOVER TEST . . . These Pinco 1510 Suspension Insulators are being subjected to a high frequency flashover test. Electrical performance of all Pinco Insulators is insured by tests such as this.

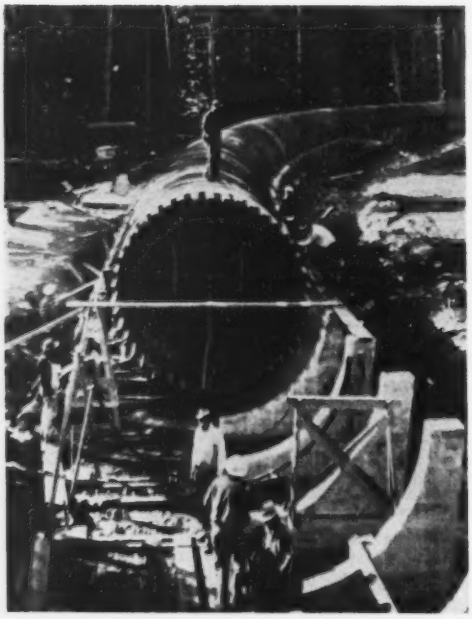
PINCO INSULATORS

RIGHT ON THE JOB—

ADVERTISEMENT

INDUSTRY NEWS IN BRIEF . . .

SANTA FE TANK & TOWER COMPANY INSTALLS HUGE REDWOOD PIPE LINE



Yamsey, Oregon . . . One of the largest wood pipe installations of its kind was installed at the Takote Hydro Electric Plant on the Umpqua River near Yamsey, Oregon. The entire Redwood stave pipe line was furnished by the Santa Fe Tank & Tower Co.

The installation has a diameter of 12 feet...large enough to drive a two ton truck through it. The huge pipe was built entirely of California Redwood staves, resting on reinforced concrete cradles. Its purpose is to divert water from the Umpqua River to a power plant pen stock.

The long life and non-corrosive qualities of Redwood pipe were important factors in this installation . . . but no more important than the ability of Redwood pipe to withstand the low temperature at high altitudes without icing. Transporting the material to this difficult site proved to be easier than it would have been with most other materials.

This and many other wood stave lines of larger and smaller sizes have been installed recently by the Santa Fe Tank & Tower Co.

Santa Fe maintains branch offices in all principal cities. For complete information and engineering data on Wood Pipe, Wood Tanks, Cylindrical Gas Scrubbers, Cooling Towers, and other wood specialties, write to Santa Fe Tank & Tower Company, 5401 So. Boyle Avenue, Los Angeles 11, California.

Drilling Concrete

(*Continued from page* 176)

of two or three men. Lack of space at the top of the cell structure prevented the use of more than one man in the actual drilling operation, but because of the nature of the work, the driller had an assistant on the floor level. Under normal conditions, drilling where space is not at a premium, one man can easily handle the Byers' equipment.

SPINNING LEAD SLEEVE to shape on old lathe modified for the purpose requires 5 min and saves beating lead with dresser

Shop Made Sleeves Cut Cable Splicing Time

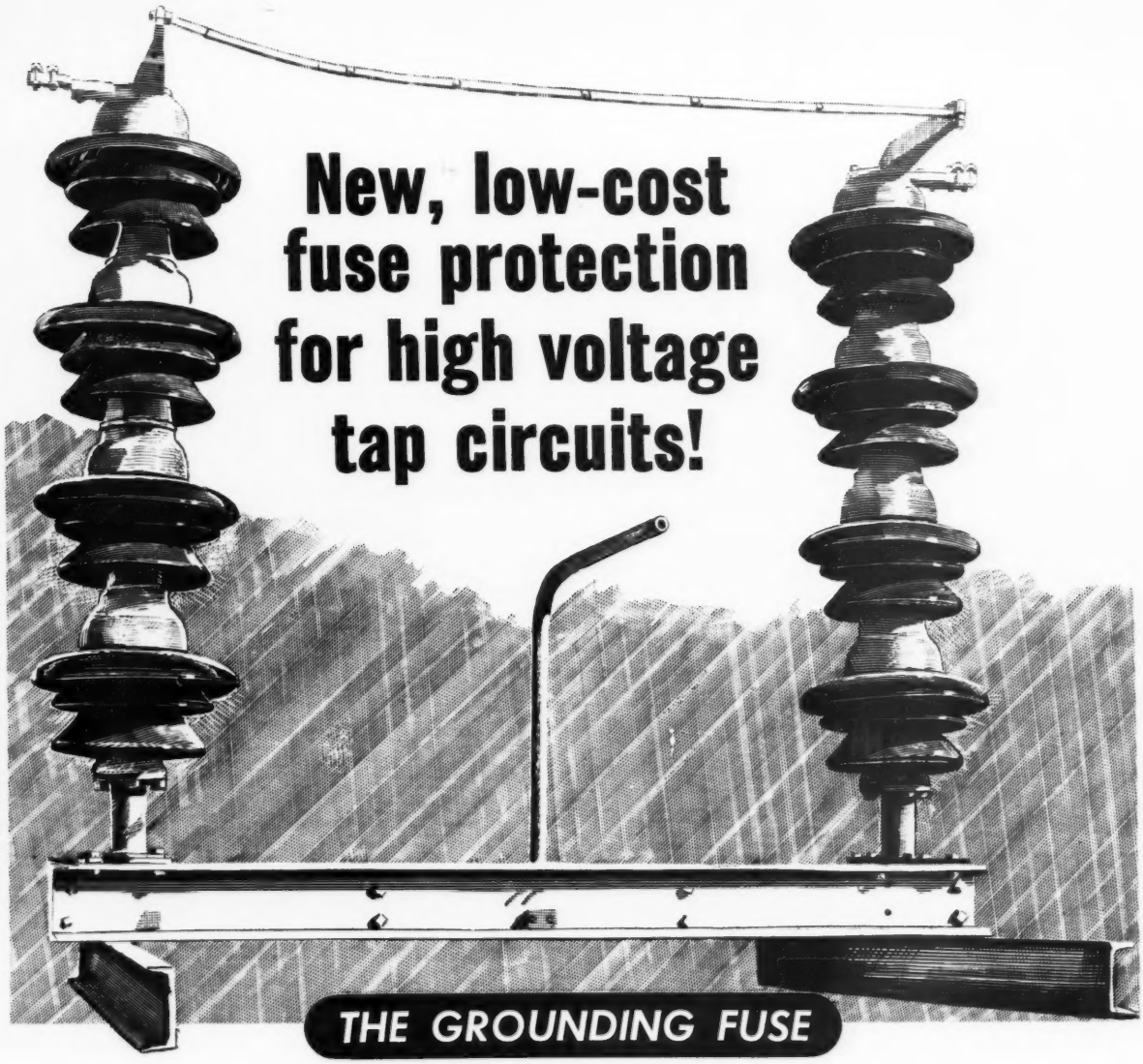
C. A. STEELE, Engineer, Electrical Construction Department, Shops and Tools Service, Commonwealth Edison Co, Chicago

Shop production of lead sleeves for cable joints has eliminated much field time required for splicing. A pneumatic press, designed and built in Commonwealth Edison shops, presses halves of sleeves on a drilling mandrel for spinning, and bells ends so that they will telescope and form tight connections for wiping.

An old lathe was modified for spinning ends of sleeves. This operation saves the work in the field of beating down lead with dresser. When proper shape has been acquired, the sleeve is cut to proper length and diameter to fit the cable sheath. Spinning and cutting operations require approximately 5 min.

Compound filling holes ½ in. in

(*Continued on page* 184)



New, low-cost fuse protection for high voltage tap circuits!

THE GROUNDING FUSE

Now you can positively and economically disconnect and isolate tap-circuit faults *without* the use of costly high-voltage circuit breakers, relays, trip-coil, spring-operated grounding switches, motor-operated disconnecting switches, or control wiring. This radically new concept in circuit protection is actually a grounding fuse containing two elements . . . the first operating at a predetermined over-current to disconnect the transformer and ground the circuit; the second operating from line-fault current to clear the circuit and allow breaker reclosure.

Simple, inexpensive yet highly dependable, this revolutionary grounding fuse has been thoroughly tested for over four years on 161 KV circuits . . . is available for voltage ratings of 115, 138 and 161 KV.

Write today for further information . . . no obligation, of course.

Electrical Equipment & Foundry Company

PINE BLUFF, ARKANSAS

No.8~ a statement

★ *The following statement appears in the forepart of our Catalog:*

"The history of the Hi-Voltage Equipment Company is one of devotion to an ideal —an ideal that we will use all our craftsmanship and inventive genius to produce equipment of outstanding merit. Expense is not a primary consideration in creating Hi-Voltage switches and protective equipment. You can rest assured that each switch is designed for those who want the utmost in operating dependability."

Every illustration on these pages is evidence that we have adhered staunchly to our fundamental policy.

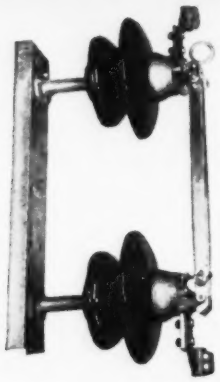
Because substation and switching stations seldom follow any particular pattern, the dependable Switch Manufacturer must offer many different and proved designs. The most practical and economical arrangement of bus work and connections to circuit breakers, transformers, etc., dictates the varying designs of Hi-Voltage Switches.

But . . . despite any variation in design . . . everyone of these Hi-Voltage Switches:

1—Has the exclusive line-type, self-aligning and self-cleaning contacts. Tests show that the life of these contacts is beyond 100,000 operations.

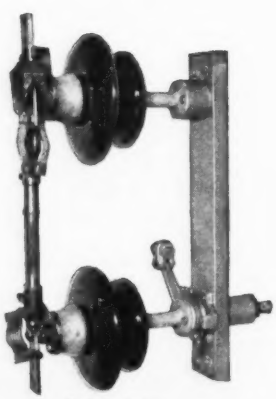
2—Reduces installation costs. The complete operating mechanism is machined at the Factory. No field drilling or cutting is required. The work done at the Factory saves hours for the construction crew.

Ask your Joslyn Representative to show you the many money saving advantages of Hi-Voltage Switches.



● **HOOK-OPERATED SWITCHES**
7,500—115,000 VOLTS
400—2000 Amperes

● **TYPE A-W**
7,500—46,000 Volts
400—1200 Amperes



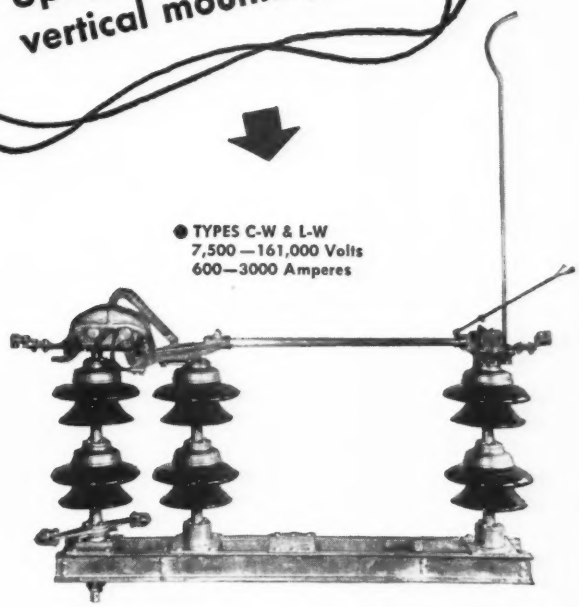
● **TYPE D-N**
Side-Opening Switch
7,500—161,000 Volts
600—1200 Amperes

HI-VOLTAGE

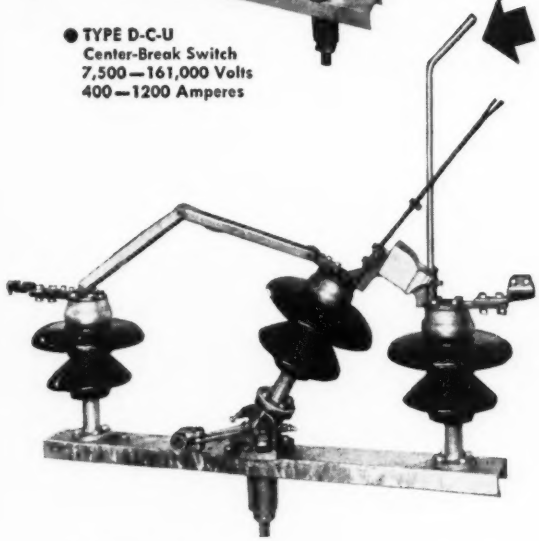
# of Hi-Voltage policy

AVAILABLE!
200 to 3000 Amperes
7500 to 161,000 Volts
Upright, underhung or vertical mounting

● **TYPE D-C-U**
Center-Break Switch
7,500—161,000 Volts
400—1200 Amperes

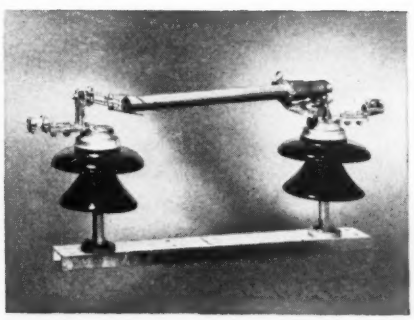


● **TYPES C-W & L-W**
7,500—161,000 Volts
600—3000 Amperes



● **TILTING INSULATOR SWITCH**
7,500—34,500 Volts
200—600 Amperes

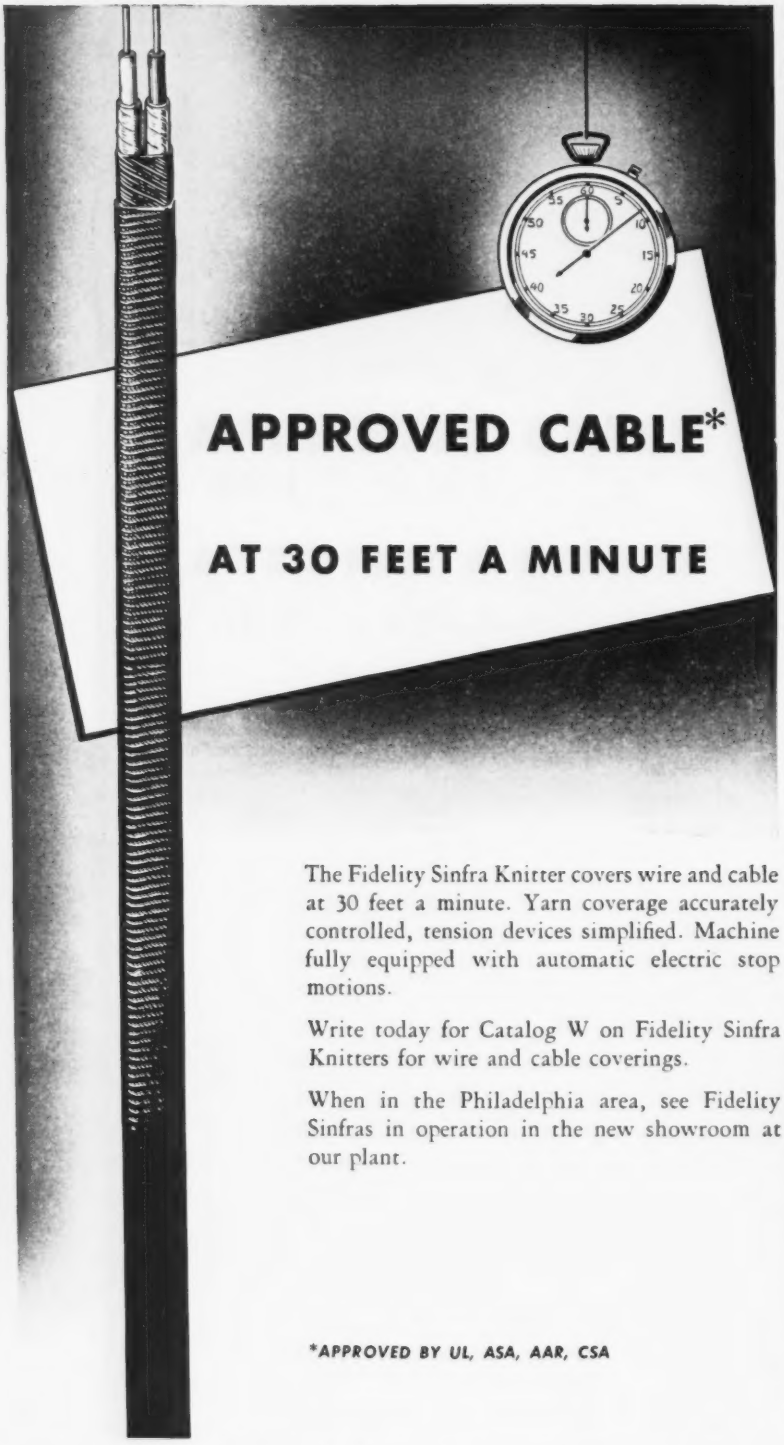
● **Hi-Voltage FUSES**
Up to 69 kv. Available in all types of mounting up to 35,000 amperes rupturing capacity.



ALSO AVAILABLE!
Grounding Switches
Manual and Automatic Control Mechanisms
Mechanical Interlocks
Cross-arms and Mounting Frames
And all customary accessories

EQUIPMENT COMPANY

4000 EAST 116th STREET • CLEVELAND 5, OHIO



The Fidelity Sinfra Knitter covers wire and cable at 30 feet a minute. Yarn coverage accurately controlled, tension devices simplified. Machine fully equipped with automatic electric stop motions.

Write today for Catalog W on Fidelity Sinfra Knitters for wire and cable coverings.

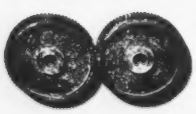
When in the Philadelphia area, see Fidelity Sinfras in operation in the new showroom at our plant.

*APPROVED BY UL, ASA, AAR, CSA

Designers and Builders of Intricate, Automatic Precision Machines

FIDELITY MACHINE COMPANY, INC.

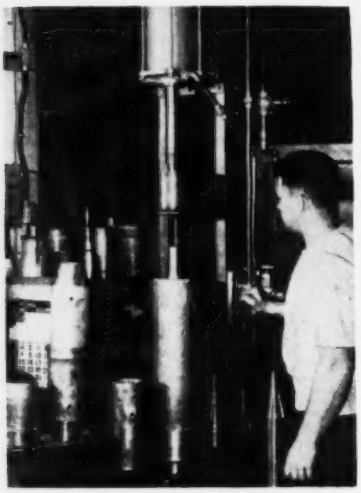
SINCE 1911



3908-18 FRANKFORD AVENUE, PHILADELPHIA, PA.

Shop Made Sleeves

(*Continued from page* 180)



PRESSING SLEEVE on a mandrel is done with pneumatic press. A finished sleeve and belling attachment are shown at left of press

diameter are punched in each half of the sleeve with a pneumatically operated punch and embosser. This saves approximately 15 min for each hole over the previous method of drilling and embossing by hand.

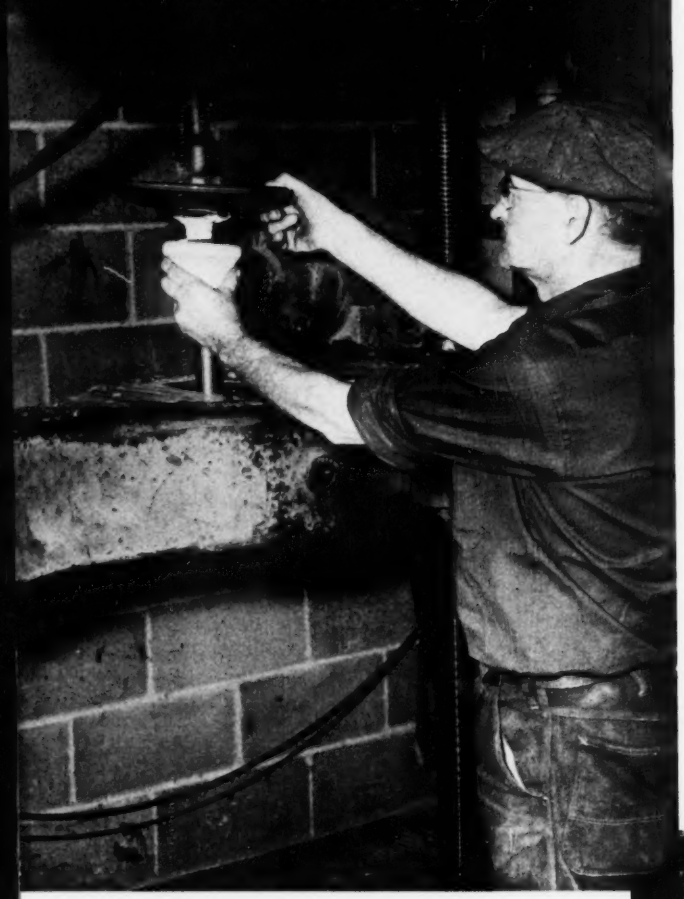
Spool Insulator Aids Wire Stringing

SPOOL INSULATOR with deadend clevis fastened to tops of crossarm with standard cutout mounting bracket makes good wire rider during stringing operations. Pin is greased so spool turns easily

Wire stringing has been made easier on the Wisconsin Public Service Corp system by fitting a spool insulator on top of the crossarm and allowing wire that is being pulled in to slide over

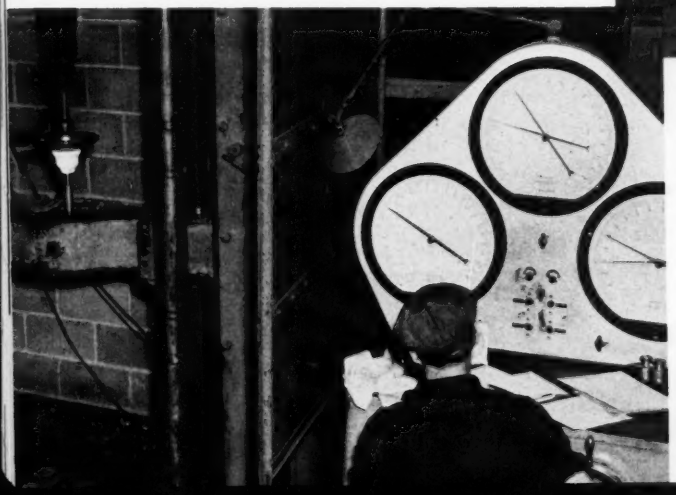
(*Continued on page* 189)

HI-TENSION NEWS *Junior*



Typical normal failure accompanied by simultaneous mechanical and electrical break-down. At a point considerably above 15,000 pounds, the porcelain failed at the cap line, exposing the end of the pin which is coated with a layer of cement.

This 10-inch suspension unit, with voltage applied just short of flashover, has reached its rated strength as shown on the lower-left-hand dial. From this point, tension is allowed to continue building up until failure occurs somewhere beyond the 15,000-pound minimum rated strength.



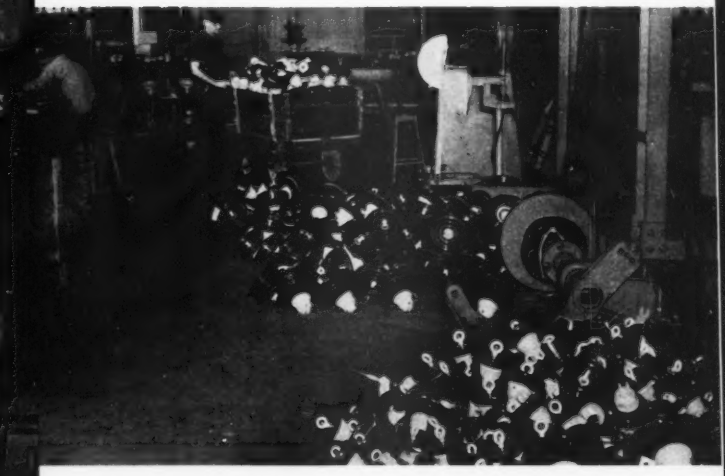
We couldn't stay in business with too many such customers

—But it Takes All Guess-Work Out of Suspension Insulator Reliability

Here's an organization with a standing order for a carload of O-B suspension insulators a month, every month of every year, for years past and with indefinite future commitments. What's more, we give them the insulators. They never build lines with them. They just smash 'em up and then come back next month for more!

Each month approximately 3,000 finished suspension insulators go from factory production to the O-B laboratory. Here, they are given destructive mechanical and electrical tests. Enough perfectly good suspension units are consumed each month to build at least 20 miles of conventional 69-kv transmission line.

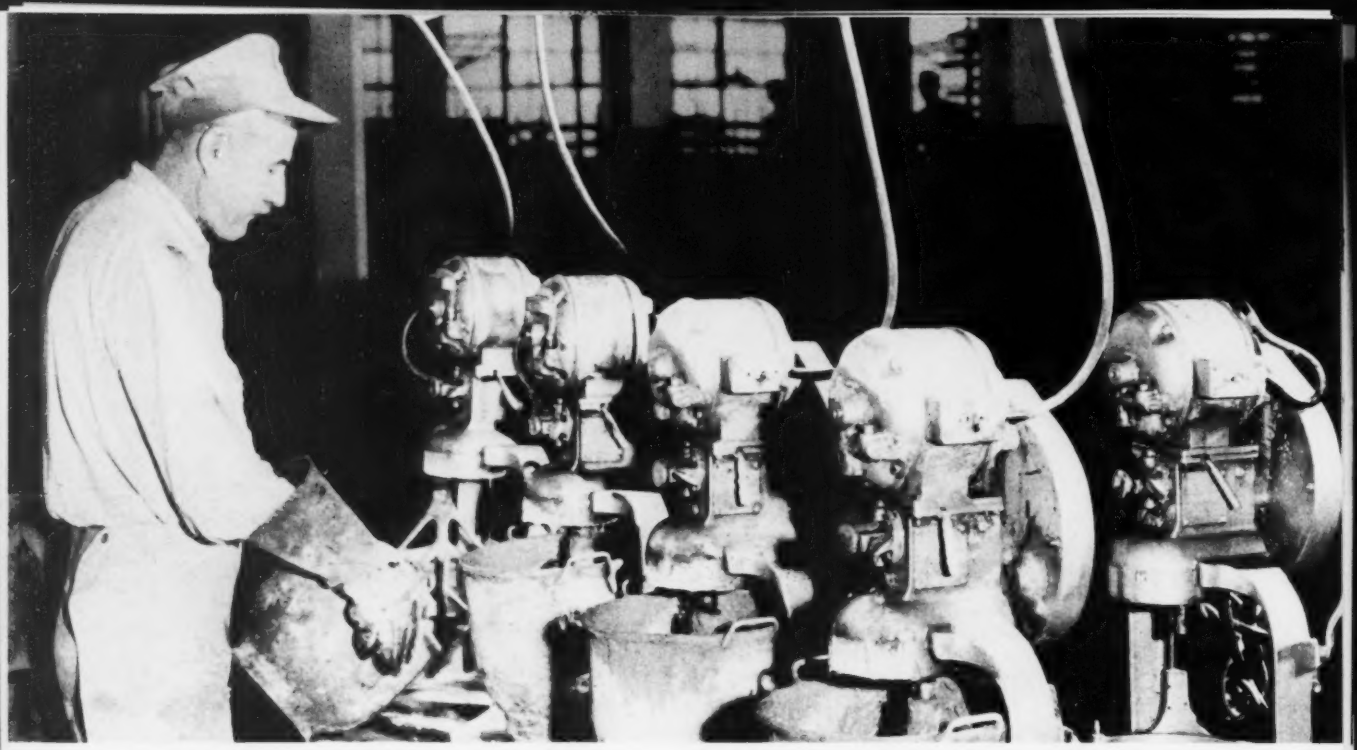
This is not done just once or twice for some special research -- it is a continuous process. What it accomplishes, however, is to put a truly significant number of points on a control curve of normal distribution so that statistical analysis of production involves no guesswork. We won't guess at the soundness of O-B suspension insulators. Because *we* won't, *you* don't have to.



Part of a day's testing on the tensile machine, where each unit goes to destruction on simultaneous mechanical and electrical load. The heavy tensile testing setup is in the right-hand background, behind a strong steel wire screen, so that the technician is protected from flying fragments occasionally caused by testing failure.

Ohio Brass

MANSFIELD, OHIO, U.S.A.



Stirring for an exact amount of time assures perfect mixture of cement and water, yet prevents over-agitation. This, plus quick use of small quantities before primary set takes place, materially improves the strength and long-time stability of the cement joint in O-B insulators.

Tons of cement . . . with a potato masher!

A Way O-B is Able to Get Stronger Insulator Assembly

Daily consumption of cement in the O-B insulator assembly department is sizable -- apparently out of all proportion to the small batches prepared with this group of ordinary kitchen mixers.

Looks inefficient, doesn't it?

Cement has the peculiarity, however, of losing strength when agitated after taking its primary set. This occurs quite quickly after the introduction of water. This extra cement strength can impart greater mechanical strength to the O-B insulators, providing batches can be used up in the first few minutes. The answer is easy -- keep 'em small and keep 'em fresh!

Such a careful process as this also makes possible more accurate measurement of cement and water, complete mixing, and overall control of this important detail that leads to a more reliable end product.

That's why O-B makes tons of cement -- but always makes it in mashed potato quantities.

Pure Portland cement of selected grade is measured by exact weight and combined with a specific volume of water at controlled temperature. Such special care aids in attaining consistent high strength of all O-B metal-to-porcelain insulator assemblies.

We bully our small pintypes

Lightning Research is One of the "Extras" You Get From O-B

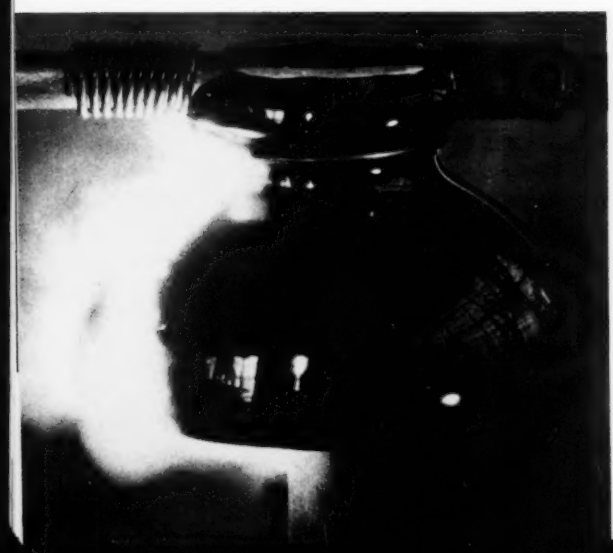
One of the country's most potent steep wave impulse generators stands on the floor of the O-B laboratory. You would normally expect to see it testing heavy equipment: long insulator strings, tall switch stacks, large bushings. It hardly seems right to let this big, powerful thing pick on a little distribution pintype. This impulse generator produces an accurate facsimile of lightning.

Sometimes we forget that small pintypes live closer to lightning than almost any other kind of insulator -- lines they serve seldom have efficient ground wire protection. When we stop to think, it is very desirable that this big generator and these small insulators be well acquainted.

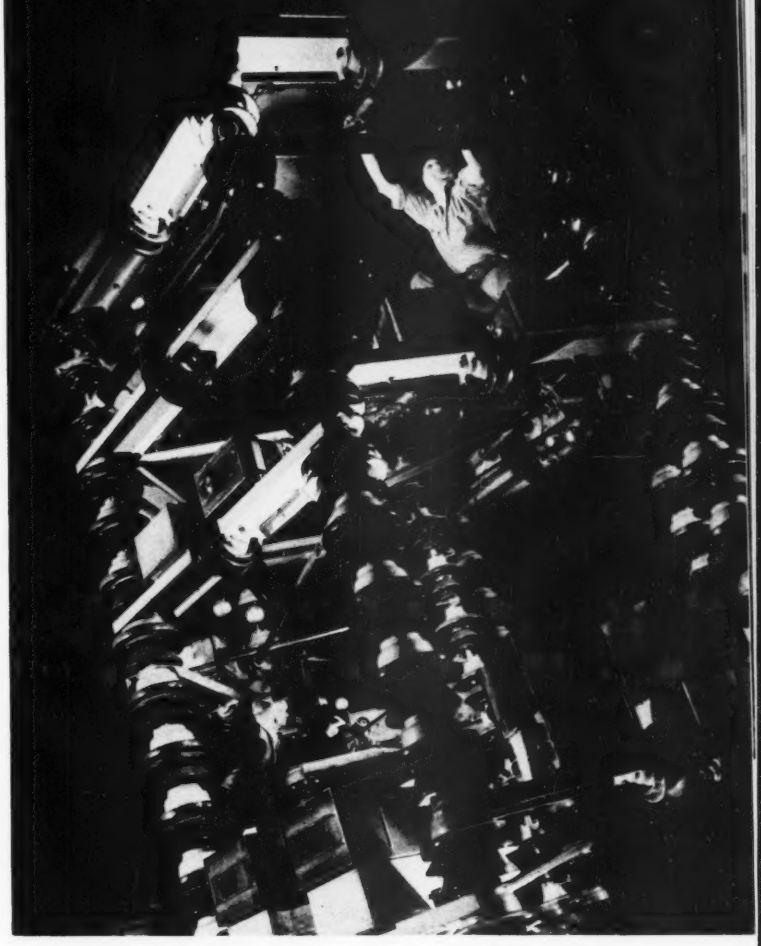
Every O-B distribution pintype design, right down to the smallest size, is an "Aluminus" of the laboratory. It has been tested and, if necessary, revised until it can demonstrate effective lightning resistance. Performance in the field bears out this laboratory research.

This is an item not included in insulator standards. Lightning research is not an obligation on an insulator manufacturer, and few laboratories can carry it on. Some stormy night, however, you will rest better when you know O-B pintypes are on your poles -- they'll still be on the job, good as ever, next morning.

Number 12852 pintype on steep-wave-front test. Such testing of so small and inexpensive a unit is often considered uneconomical, because of the high investment and operating cost involved in the ownership of a large impulse generator. This kind of research, however, has made it possible to build high lightning immunity into even the smallest O-B pintype insulators.



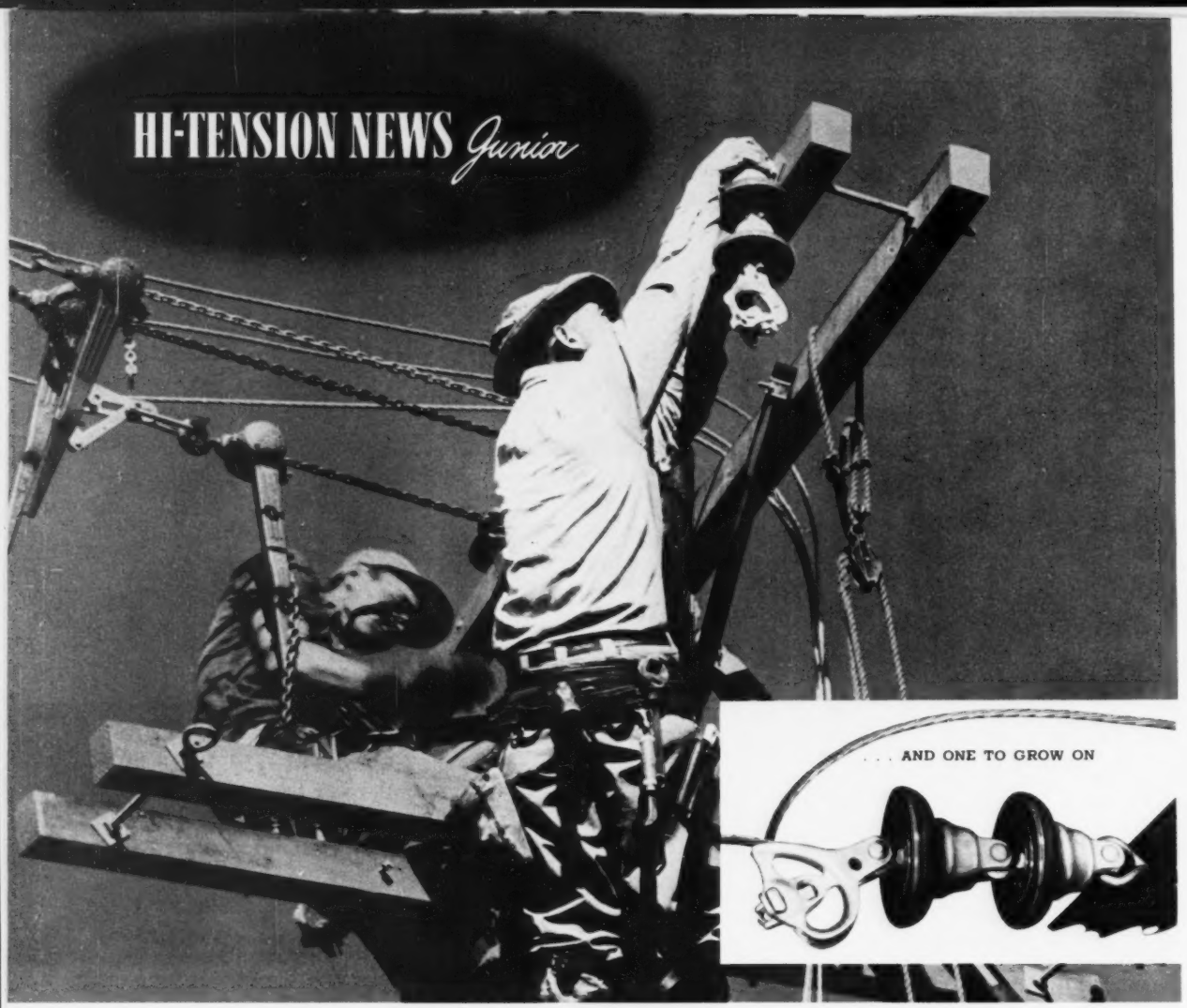
HI-TENSION NEWS *Junior*



Men adjusting the steep-wave impulse generator in the O-B laboratory. This powerful testing tool is capable of rates of voltage rise in the order of 8,000 kv per mu-sec. This imposes what experience shows to be a reliable and vigorous lightning test. The smallest pintypes will be exposed to this violent discharge and must survive repeated "shots" of lightning intensity.

Ohio Brass

MANSFIELD, OHIO, U.S.A.



You may pay $100 apiece for your six-inch suspension insulators

Primary Deadend Reconstruction is Costly — and Unnecessary

Insulators you now buy for less than two dollars may later install for a hundred dollars apiece, or more! You don't have to get caught in this market, however, if the "handwriting on the wall" is heeded.

Urban power consumption is going up in the general order of 10 per cent a year. When the distribution system reaches capacity, this can often be extended by increasing primary voltage. It looks like demand and voltage may be playing "leapfrog" for a good many years hence.

At some stage in this process, deadend insulation will become inadequate if it has not been given plenty of room to grow. Such inadequacy must be corrected. This usually consists of adding a second six-inch suspension unit to the one previously installed. Sometimes it must be done with the lines hot. In any case, it ties up a crew and a line truck while the replacement is being made. Conductors must be re-sagged to compensate for the added 5½ inch section length of the second insulator. Operators have told us that this extra insulator has often cost them a hundred dollars.

There's no reasonable doubt as to the soundness of building primary distribution deadends to accommodate future growth. It's a lot cheaper to build them just *once* than *twice*!

O-B six-inch suspension insulator units are carried in local stocks of your nearest Graybar house. This will assure faster delivery and reduce inventories.

4394-H

Distributed by GraybaR ELECTRIC COMPANY

Ohio Brass

MANSFIELD, OHIO, U.S.A.

Spool Insulator

(*Continued from page* 184)

the insulator groove instead of the crossarm. The wire slides more easily.

A deadend clevis with insulator is fastened to the crossarm with a standard cutout mounting bracket. One clevis is required for each conductor being strung. The pin is greased so that the insulator will turn easily on it. Several layers of tape are wrapped in the groove of the insulator spool to protect the glazing.

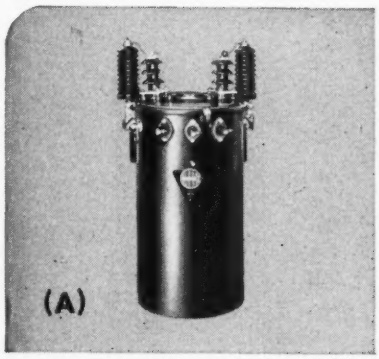
As much as 15 reels of 2F copperweld, 7,200 ft to a real, have been pulled over this device without damage to wire or crossarms. Fewer splices are required. Wire can be sagged longer distances and sagging is better because there is less friction. Costs are low because all materials are always on hand.

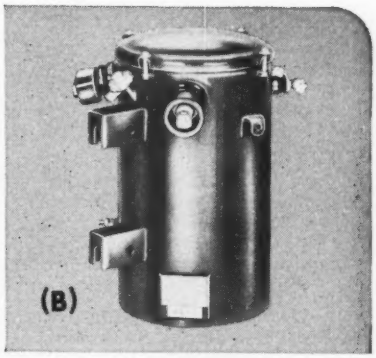
This idea was developed by Robert Voight and Edwin DeGroot.

Inventory Speeded With Rack Storage

Semi-annual transformer inventory time has been reduced from a two- or three-week job to a two- or three-day job by Toledo Edison Co through the use of a rack storage system. Racks are made of steel beams and each transformer is stored on a pallet on the rack, permitting movement to and from racks with a fork lift truck. Storage space required has also been greatly reduced by use of the racks.

Transformer Manufacturers **Know** oil oxidation problems...

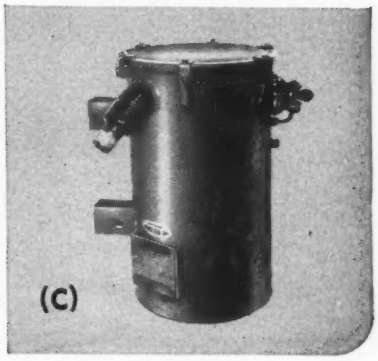




(A) Line Material Co.

(B) RT&E Co.

(C) Allis-Chalmers Manufacturing Co.



and they use DBPC!

• Leading manufacturers have proved by exhaustive tests the need for an inhibitor to protect transformer oil from oxidation and sludge. So they sell their transformers already protected—with DBPC inhibited oil.

DBPC Oxidation Inhibitor is placed in the transformers at the time of manufacture, and its constant use is advised from then on. DBPC keeps peroxide formation within the transformer to a minimum, and retards sludge formation. Because it lengthens the oil life, DBPC reduces oil cost and drastically cuts transformer maintenance costs.

Practically all of the transformer manufacturers in the country have adopted the use of inhibited oil in distribution transformers.

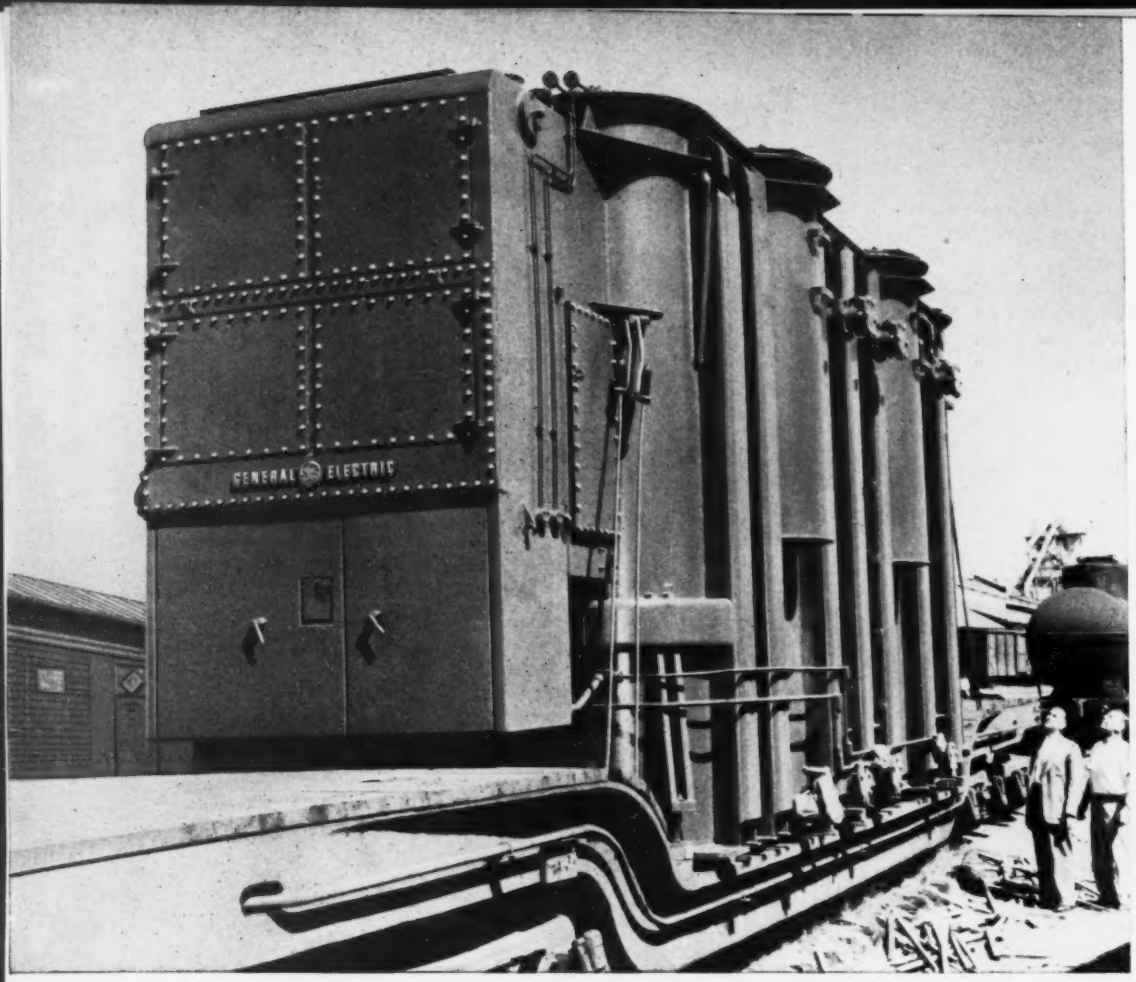
Most major oil suppliers advocate inhibiting, and will supply new inhibited oil upon request. So when you buy transformer oil, or reclaim used oil, insist that it be inhibited with DBPC—for the life of your transformer. If you wish additional information on DBPC, write to:

KOPPERS®

Koppers Chemicals

KOPPERS COMPANY, INC.

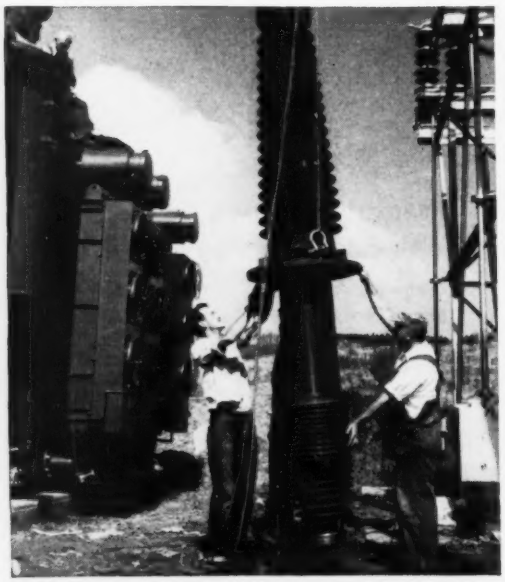
Chemical Division, Dept. EW-5183, Pittsburgh 19, Pa.



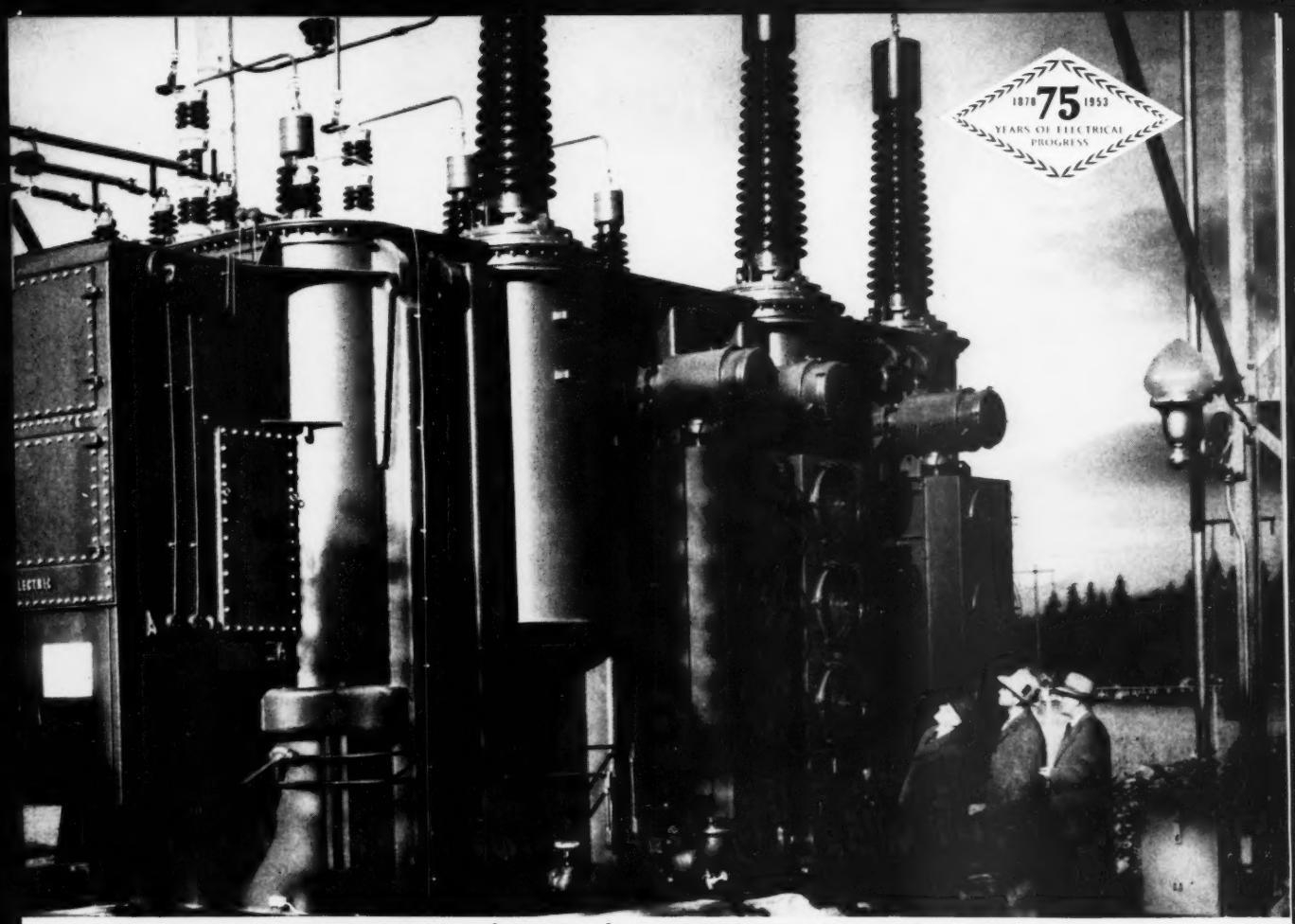
Upright shipment in one-piece tank means you can . . .

INSTALL G-E "CONCENTRIC LAYER"

TRUCK SERVES AS WINCH to transfer the unit from railroad car to trailer for the 2-mile trip to the foundation. Large cranes were eliminated, thus saving time and money.



BUSHINGS WERE INSTALLED just two days after unit was placed on foundation. One-piece tank construction contributed to speed of installation.



8 DAYS AFTER DELIVERY (one day was lost due to rain) this 125,000-kva, 220-kv—115-kv—13.2-kv autotransformer was ready to energize. Unit is cooled by directed flow of forced oil.

TRANSFORMERS FASTER . . . AT LESS COST

Washington Water Power energizes 125,000-kva G-E unit 8 days after delivery

Recently installed at the Beacon Substation of the Washington Water Power Company of Spokane, Washington, this General Electric autotransformer joins a 220-kv line, from the company's new Cabinet Gorge generating station, to an existing 115-kv system. This transformer, one of the largest autotransformers ever installed in the Pacific Northwest, is equipped with plus and minus 5% load-ratio-control. A second identical unit is now being installed and the two units will carry the entire output of Cabinet Gorge.

Reduced weight and dimensions resulting from the use of G-E "concentric layer" high-voltage windings permitted the autotransformer and the load-ratio-control series transformer to be fitted into a one-piece tank and shipped in an upright position.

In addition to their inherent compactness, "concentric layer" windings provide:

- High impulse strength due to uniform distribution of impulse voltages and the elimination of harmful oscillations.
- Effective inter-layer cooling—vertical ducts between layers permit unrestricted oil flow past each conductor.
- Greater mechanical strength because major magnetic forces are radial and well within the tensile strength of the conductor.

If you contemplate systems 161 kv or above in high-capacity ratings, it will pay you to review the data on "concentric layer" transformer design. Ask your G-E Apparatus Sales Representative for Bulletin GER-129, or write to Section 421-1, General Electric Company, Schenectady 5, New York.

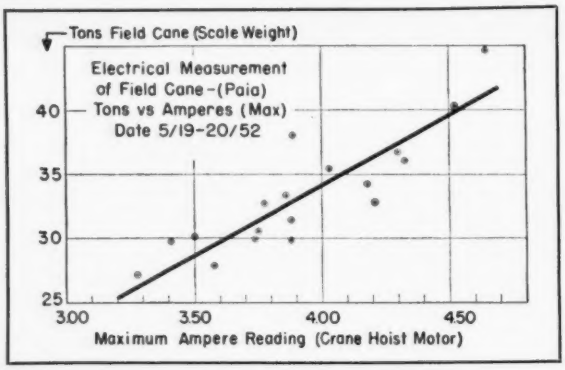
You can put your confidence in—

GENERAL ELECTRIC

ELECTRIC CRANE lifts large net to unload sugar cane in trailer bin. Ammeter recording peak current is calibrated to give estimate of load weight sufficiently accurate for mill purposes

New Electric Method Improves Weighing Reliability

A new method of weighing loads of sugar cane electrically, devised and put into regular operation by the Hawaiian Commercial & Sugar Co, is more reliable than former strain gage method. A recording ammeter on the electric motors of unloading cranes registers the amount of current used. From this, weights are deduced on theory that heavier loads require more current.



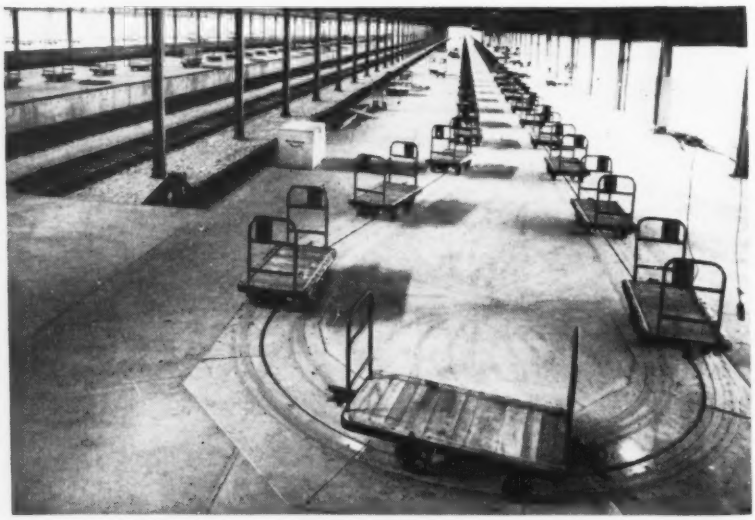
AMPERE TONNAGE chart enables operator to record tonnage

It is a simple procedure for the unloading operator to note the number of amperes used, compare that to the equivalent tonnage figures on a simple chart, and then to record the tonnage. Checking the weights thus figured against scales in the mill yard shows the system to be much more reliable than that of employing strain gauges on the gooseneck between the cabs of the big cane trucks and their trailers. An uneven distribution of the load produces sharp variance in the strain gage readings.

The ampere method is not accurate for individual loads which range upwards from 40 tons. It may be off four or five tons on any given load but on the average, over a working day, the figures have been found to balance out accurately enough for mill purposes.

The tonnage-ampere charts include a compensation for all factors such as unloading nets and other equipment involved. As there is no shifting of gears, pull is constant and peak is reached as the crane lifts its full load.

Tow Conveyor Cuts Freight Handling Costs



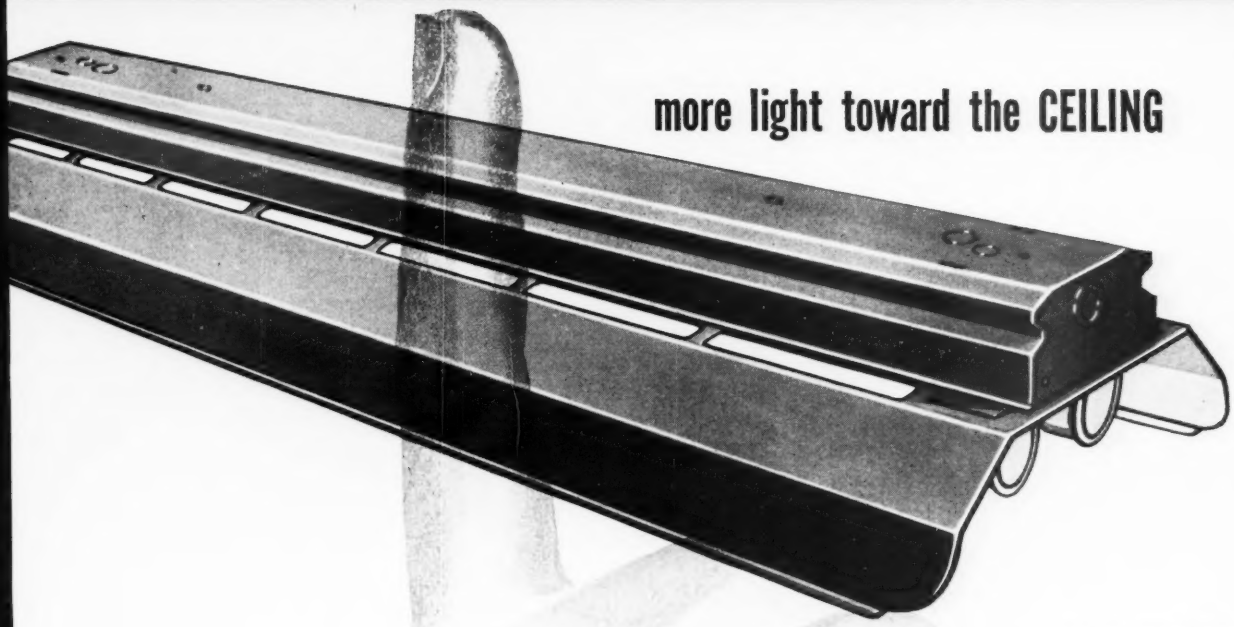
CONVEYOR SYSTEM has two chain circuits, a capacity of 500 four-wheel platform trucks and is said to be the first system of its kind to be built into a railroad freight station

Tow-conveyor system is important part of Santa Fe Railway's modern freight handling facilities at its new freight house in Chicago. The new freight house was built for handling less than carload merchandise.

Four-wheel trucks are loaded with freight and by the flip of a foot pedal, a rod on the cart is dropped down through a slot in the floor of the station platform into a chain conveyor system. This pin can be raised or lowered to put the truck in or out of the line at any point along the system and the truck requires no attendant enroute.

Operation consists of a roller type chain installed in the floor of the station platform beneath the special slot openings. Catch devices in the chain are 15 ft apart.

The entire system has a capacity of



more light toward the CEILING

means more seeing comfort BELOW!

• • • new Benjamin Diffuser-Reflector now delivers almost TWICE THE UPWARD LIGHT!

- **increases brightness control for greater uniformity of light**
- **eliminates annoying shadows that distract from work**
- **reduces contrasts that can cause eye fatigue**

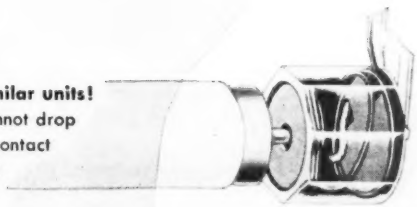
This improved, all-porcelain-enamel Benjamin Diffuser Reflector enables you to utilize highest light levels and still enjoy comfortable seeing conditions, without materially reducing lighting efficiency.

The answer lies in a series of 14 apertures, located on the top of the reflector, 7 above each lamp. Together, they direct 12.6%* of the light toward the ceiling. This greater upward light helps relieve disturbing contrasts between upper and lower room areas. It wraps the entire room in *uniform illumination*, so important in reducing eye strain and fatigue caused by excessive brightness contrast. For further details and lighting data, send for Data Bulletin. Benjamin Electric Mfg. Co., Dept. K, Des Plaines, Illinois.

**for 2-lamp units. 10.7% for 3-lamp units. As compared with 6.7% and 5.8% respectively, delivered by previous Benjamin diffuser-reflectors.*

. . . and of course, it has "SPRINGLOX," the exclusive, metal-clad lampholder!

distinguishes Benjamin Diffuser-Reflector from all similar units! cuts out-of-service time due to socket failure . . . lamps cannot drop out or be shaken loose . . . never fails to make electrical contact the *first* time . . . patented spring construction is the secret!



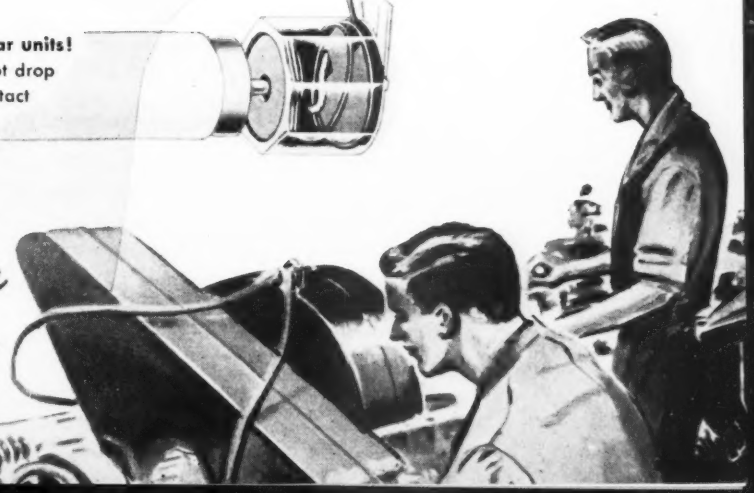
BENJAMIN

Diffuser-Reflector

Sold exclusively through electrical distributors

available in open-end and closed-end units, for single or bi-pin lamps.

a product of Benjamin Electric Mfg. Co., makers of famous Benjamin and Leader Line lighting equipment and Sound Signals for Industry, Institutions and Commerce



B-260

SHAWMUT'S NEW FORM 208 Amp-trap®

SAVES BOTH CIRCUIT AND CUSTOMER
(FOR 120/208 VOLT AC OR 125/250 VOLT DC NETWORKS)

POSITIVE PROTECTION AGAINST SUPERCURRENTS

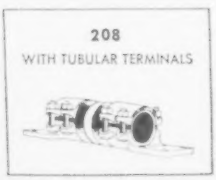
Low voltage AC and DC networks give large utilities and their customers greater continuity of service and easy expansion of their systems. The only drawback to this type of network is the constant threat of danger from heavy short-circuit or fault currents. Shawmut's new FORM 208 Amp-trap eliminates this danger from these circuits. On actual test, its amazingly fast "chop-off" stops a short-circuit *even before it reaches the peak of its first ¼ cycle — even if the available peak current could reach* 560,000 *Amps!* It anticipates and prevents the destructive build-up of heavy fault currents so dangerous to office buildings, stores, hospitals, theatres, schools, etc. FORM 208 saves *both* circuit and customers.

USES & SPECIFICATIONS

Amp-trap FORM 208 is made for Entrance Switch Service, Underground Network Conductors, Distribution & Panelboards and other applications. It is built in Ampere ratings of 1000, 1200, 1600, 2000, 2500, 3000, 4000 and 5000 for Entrance Switch Service and for cable sizes from 4/0 to 1000 MCM. It runs "cool" and carries 100% of its rating with temperature rises less than those recommended in the Underwriters' Laboratories Standards for Fuses. The watt (power) loss is probably lower than for *any other over-current protective device.* Hence it may safely be installed in vaults and steel enclosures and subjected to long continued loads.

LOW IN COST — EASY TO INSTALL

FORM 208 Amp-traps clear fault currents long before they can burn or wreck bus bars and switch gear. Yet they are small in size, low in cost and easy to apply. They have a variety of mountings for flat, bus or tubular connectors. Adapters can be supplied for switch cubicles now equipped with copper or aluminum alloy links. FORM 208 is the "little brother" of the famous FORM 600 Amp-trap which has long been used so successfully on 600 volt circuits. Write today and find out about FORM 208 at once.



Copyright 1953 The Chase-Shawmut Co.

OUR 60 YEAR — FROM EDISON TO ELECTRONICS

208 AMP-TRAP — "Awake At The Switch"

THE CHASE-SHAWMUT CO.

373 MERRIMAC STREET • NEWBURYPORT, MASSACHUSETTS

500 four-wheel platform trucks. The roller chain moves at a variable speed of 110 to 160 ft per min. There are two separate chain circuits. The freight house is 1,325 ft long and 204 ft wide.

A special arrangement, the first of its type ever installed, permits towing the four-wheel trucks across tracks. This eliminates bridging across tracks and disconnecting of the chain each time railroad freight cars are moved in and out of the freight house.

Safe Strip Heaters Cut Lubricant Waste

W. D. ZIMMERMAN, Industrial Rep., Pennsylvania Power & Light Co, Williamsport, Pa.

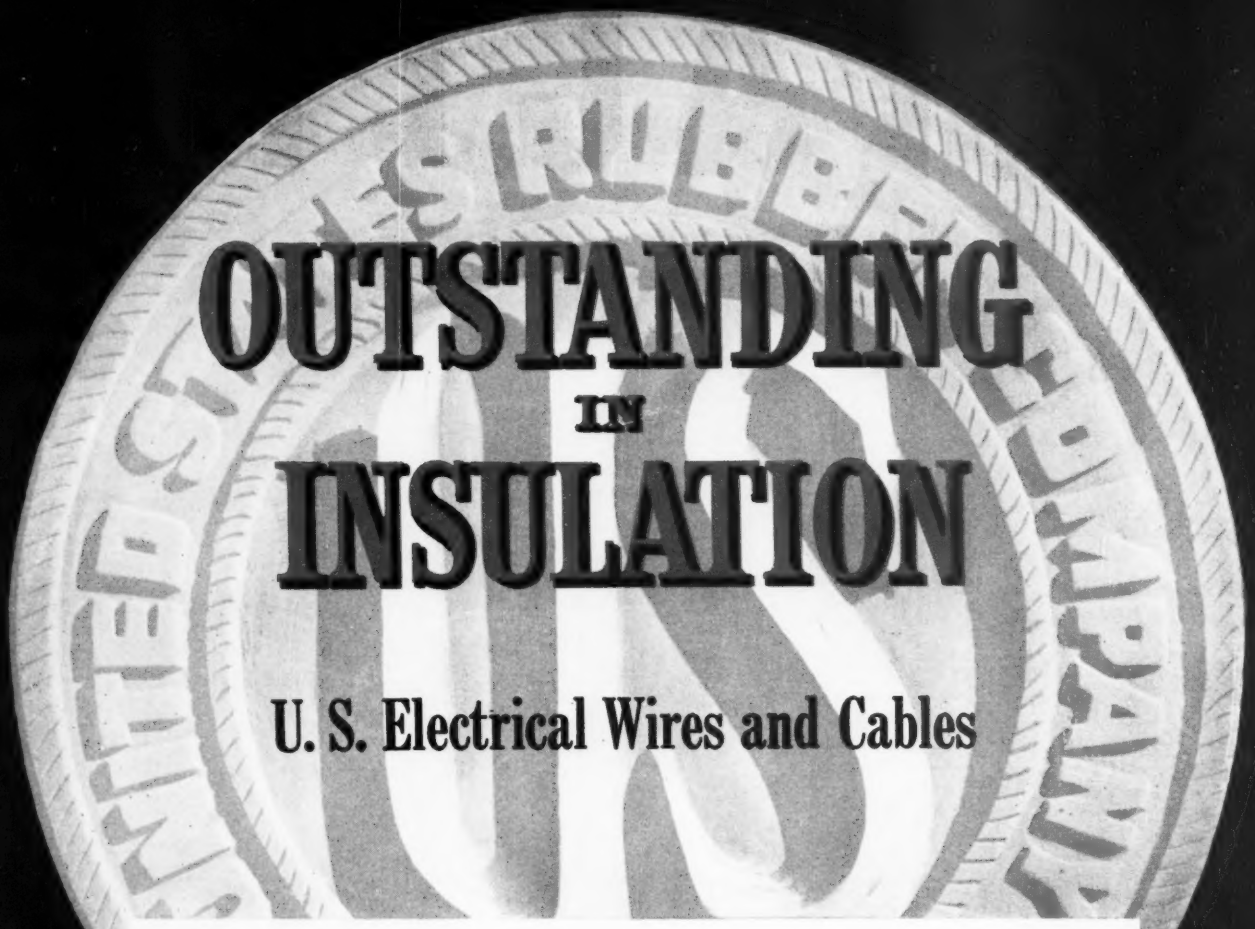
Heating lubricants with electric heat has eliminated danger of fire from open flame at the Sunbury Wire Rope Mfg Corp, Sunbury, Pa. Waste of lubricant has nearly been eliminated by handling and applying lubricant at controlled temperature and by reusing excess. Better product has resulted with more uniform and controlled application of lubricant.

Lubricant in a solidified form is received in steel drums. After the top of the drum is removed, it is placed inverted over an opening in top of an insulated tank. An insulated hood with four 1000-w strip heaters bolted to its metal interior case is placed over the inverted drum to melt lubricant from the drum and have it drain into the tank. Eighteen 1000-w strip heaters are bolted to tank sides and bottom to melt lubricant to desired temperature so that it can be drained from the tank and placed in tanks where it is used in processing the cable.

On one cable finishing machine the rope is threaded through a tank and cable is dipped into lubricant. This tank employs 6000w in strip heaters mounted between the tank and insulated covering. In case of another finishing machine, hot lubricant is pumped from a tank heated by 14-1000-w strip heaters mounted on sides and bottom to a special fitting surrounding the cable as it travels to the shipping reel. Hot lubricant completely surrounds the cable and excess is wiped off by another fitting, and drained to heated tank to be recirculated. All lubricant is heated to about 300 F and each tank is therm-

(*Continued on page* 199)

UNITED STATES RUBBER COMPANY



OUTSTANDING IN INSULATION

U. S. Electrical Wires and Cables

LAYTEX® RUH-RUW—The world's smallest diameter, lightest weight natural rubber-covered power and lighting wire.

NEOLAY® RU—With Laytex Insulation plus Neoprene. Nylon cover makes pulling five times easier.

CONTROL CABLE—Insulated with Laytex for greater circuit integrity.

NEOPRENE COVERED SERVICE ENTRANCE CABLE—Flame retardant, moisture resistant—the first ever accepted by Underwriters' Laboratories, Inc.

MUNICIPAL SIGNAL CABLES—Insulated with Laytex for maximum moisture resistance.

POWER CABLES—Of every description, including the famous Grizzly® line of tough cables.

ALUMINUM WIRES AND CABLES—U. S. Rubber introduced insulated aluminum conductors.

ELECTRIX® PLUGS—U. S. Rubber was a pioneer in the development of soft rubber plugs for extension cord sets and power supply cords. (Also all rubber cube taps.)

ROYAL PORTABLE CORDS AND CABLES—And many other types of electrical wires and cables.

ROYAL MINING MACHINE & LOCOMOTIVE CABLES—Tested many different ways to insure complete dependability.

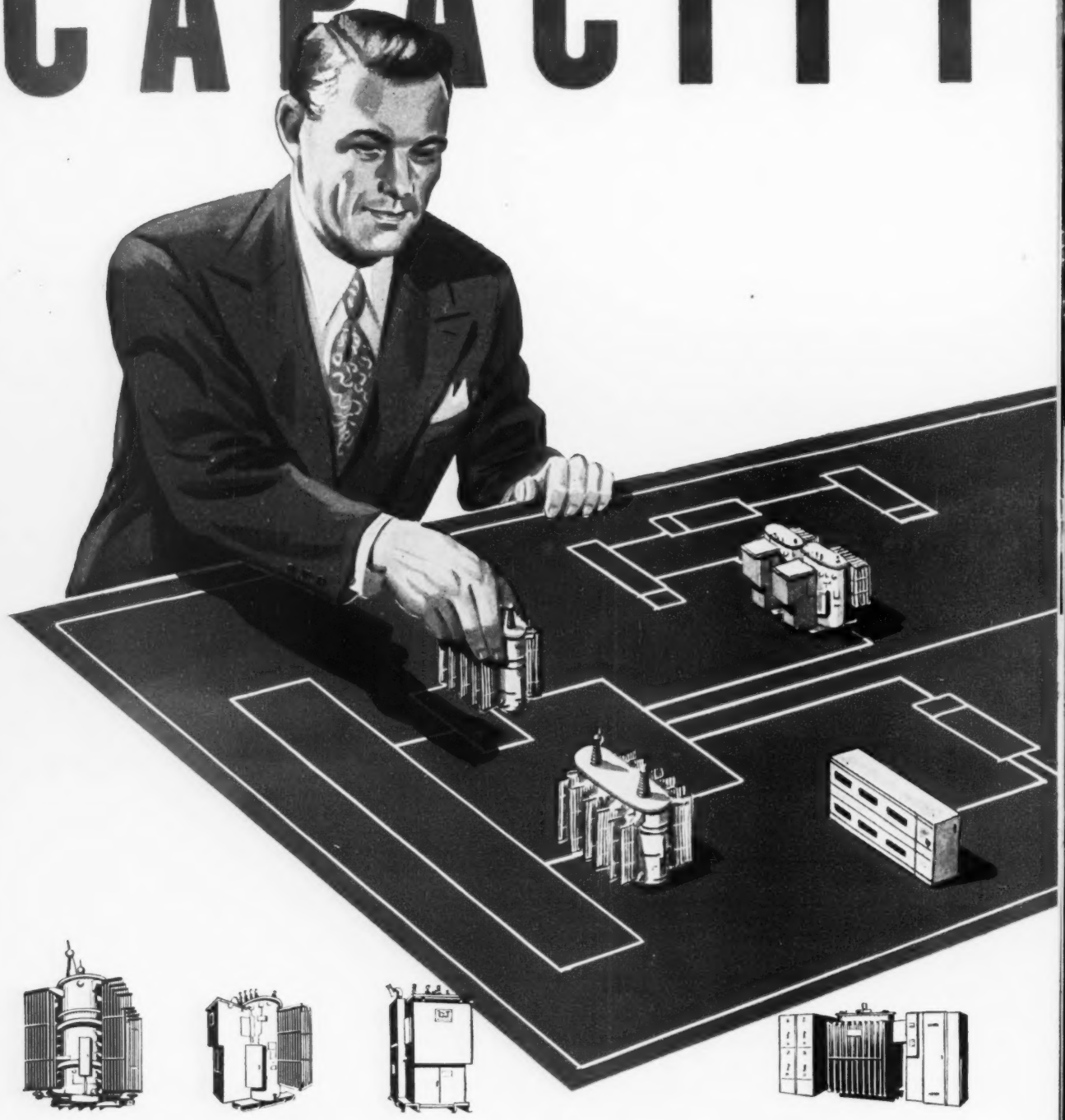
INTERCOMMUNICATION CABLE—With thermoplastic insulation and jacket making this cable flameproof throughout.

TWISTED SERVICE DROP CABLE—Either neoprene insulated or performance insulation and neoprene jacket; copper or aluminum conductors.

NITED STATES RUBBER COMPANY · ELECTRICAL WIRE & CABLE DEPARTMENT

1230 Avenue of the Americas · Rockefeller Center, New York 20, N. Y.

CAPACITY



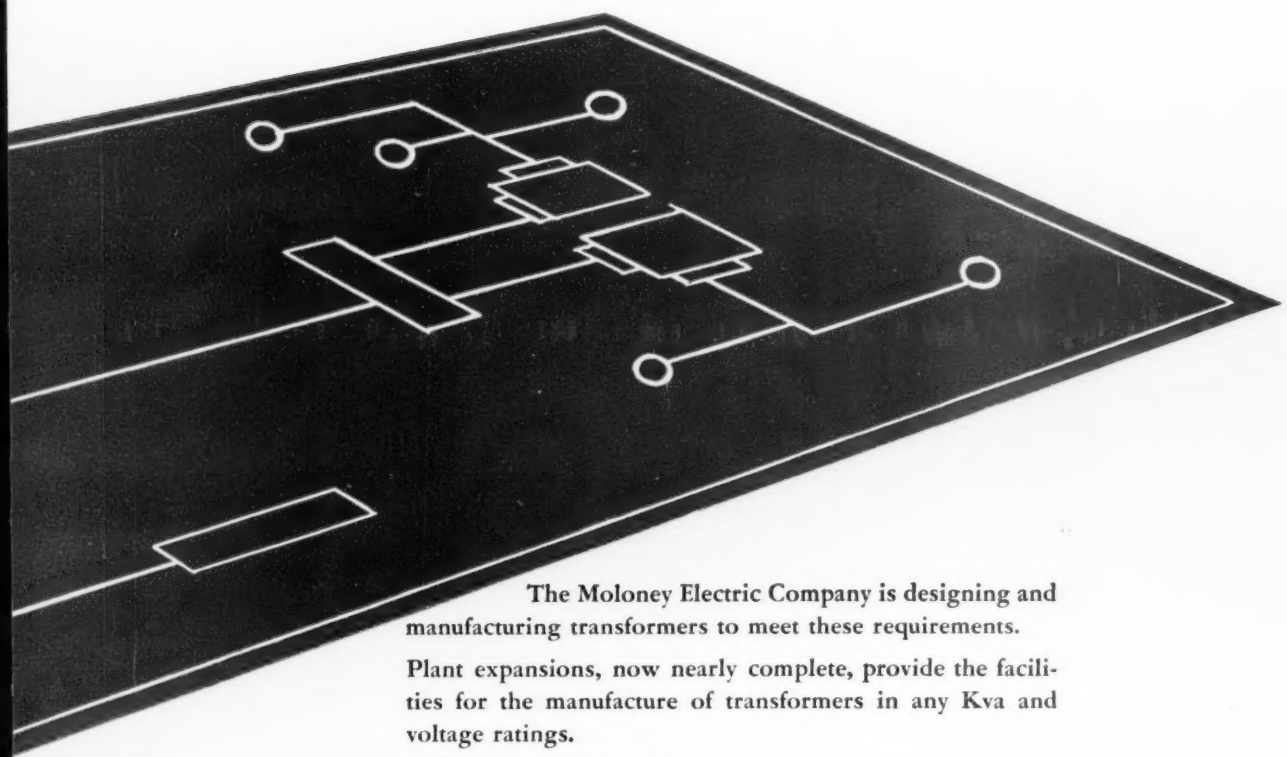
M O L O N E Y E L E C T R I C

Manufacturers of Power Transformers • Distribution Transformers • Load Ratio Control

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS

. . . TO FIT YOUR PLANS

The increased use of electrical power has required utility engineers to design toward greater capacity and higher voltages. Today's planning requires engineering and manufacturing facilities capable of producing equipment of these higher Kva and voltage ratings.



The Moloney Electric Company is designing and manufacturing transformers to meet these requirements.

Plant expansions, now nearly complete, provide the facilities for the manufacture of transformers in any Kva and voltage ratings.

Moloney, growing with the electrical industry for over 57 years, has the transformer manufacturing and engineering capacity . . . *"to fit your plans."*

ME53-8

C O M P A N Y

Transformers • Step Voltage Regulators • Unit Substations

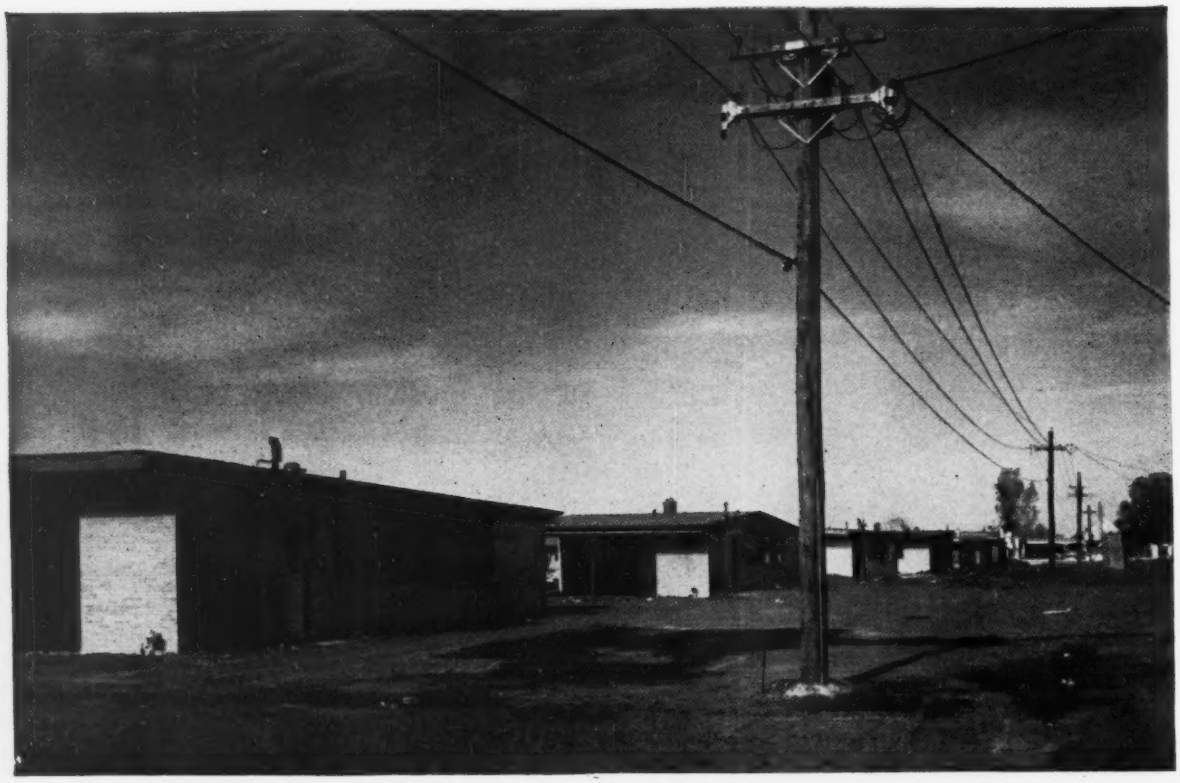
MO. AND TORONTO, ONT., CANAD

MOLONEY ELECTRIC = { BETTER PERFORMANCE / GREATER RELIABILITY / LESS MAINTENANCE

DOW

CLEAN POLES MAKE FAST FRIENDS

PENTA builds good customer relations



PENTA pressure treated Southern Pine poles installed in the Chicago area.

The Dow Chemical Company
Dept. PE 3-281-A, Midland, Michigan

_____ Send me free booklet, "Pointers on Penta."

_____ Send me list of PENTA treating plants.

_____ Please have technical representative call.

Name_____Title_____

Company_____

Address_____

City_____State_____

Poles treated with *clean* PENTA* are being placed in many new residential areas by the Illinois Bell Telephone Company. They are playing their part in this company's far-sighted customer relations program. *Clean* full-length PENTA treatment for poles and cross-arms reflects sound management. Since PENTA lengthens wood life many times, it cuts repair and maintenance costs to save you money. Poles treated with PENTA are clean and easy to handle—a modern method of wood treatment for modern settings.

Specify *clean* PENTA treatment for all your wood preserving needs and be certain of lower maintenance costs—better customer relations. Write Dow today for information about *clean* *PENTAchlorophenol. THE DOW CHEMICAL COMPANY, Midland, Michigan.

you can depend on DOW CHEMICALS

DOW

Strip Heaters

(*Continued from page* 194)

ostatically controlled to hold a constant temperature.

Lubricant was formerly removed from a drum by heating sides with an acetylene torch. Partially melted lubricant was placed in small tanks mounted above cable. These tanks were heated by gas flame and valve regulated flow of hot lubricant by gravity to cable.

Infrared Oven Ups Production 300%

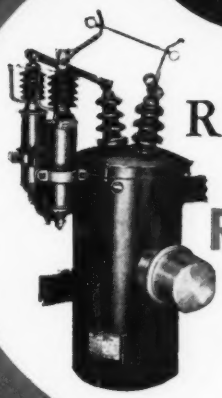
A 45-kw, infrared oven and conveyor system has increased production of tubular steel school furniture 200-300%, at the Hillside Mfg Co, North Adams, Mass., according to Peter Schubnel, owner. The furniture is degreased, etched, dip painted and baked. Hourly production is 30 to 60 units, depending on size.

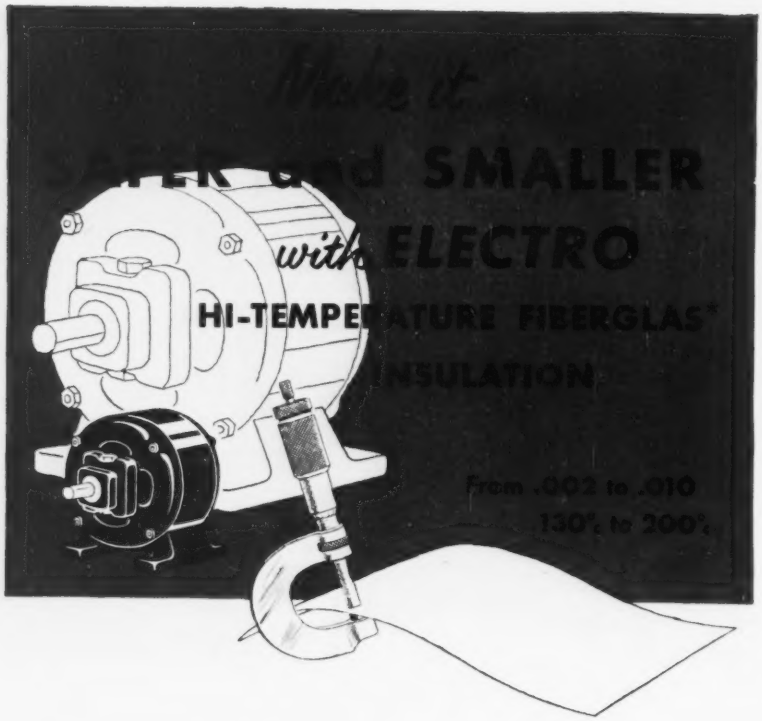
The potential rate of production can mean an increase of from 500 to 700% with a saving of about 33 1/3% manhours per unit. The paint dipping process will save about 25% over former process of spraying. Mr. Schubnel says that the new equipment will make it possible for him to compete with larger manufacturers. The baked enamel finish is highly superior to the former air dried finish. Rejects have been greatly reduced since reduced handling has almost eliminated scratching of the finished surface. Electric heating was selected over other types of heating because of lower first cost, greater flexibility, faster production, compactness of equipment requiring less floor space, and a uniform high quality of product.

The electrical cost of baking the finish of each unit varies from about 1½ to 6½ ¢, depending on the size and spacing of units on the conveyor system.

The infrared bank consists of 120-250-w infrared lamps to bring the product up to heat and 120-125-w infrared lamps to hold the product at temperature. The load of 45 kw is balanced on the 3-phase, 230-v supply bus by wiring pairs of lamps in series. High heat and low heat sections of the bank are separately controlled by hand.

The bank was designed by Howard Hands of the New England Power Service Co. B. D. Barry, Northern Berkshire Gas Co., North Adams, Mass.

VOLTAGE UP
COST DOWN
Artie One-step
WITH RTE (artie) ONE-STEP

RT&E Co.'s VOLTAGE REGULATOR
GET LOW COST REGULATION
Extend the load life of your distribution lines to their fullest before you spend large sums of money on reconductoring, rephasing, and adding substations.
R T & E's "Artie" One-Step Regulator is the quickest, easiest, and most economical way yet devised to correct voltage drop and increase the load life of your lines.
In less than 24 hours you can engineer line requirements, locate regulator position, and install "Artie" One-Step Regulators in service.
Be smart—do it the R T & E way.
For complete details on operation, construction, and installation, write for booklet "OSR-1."
632 N. 8TH ST. MILWAUKEE 3, WISCONSIN
RT&E Co.
BRANCH PLANT: WAUKESHA, WISCONSIN



ELECTRO insulating materials combine these important qualities: high dielectric and tensile strength, minimum bulk, excellent thermal conductivity and flexibility, marked resistance to heat, oil, acid and moisture. That's why these insulating materials are used effectively in the design and production of high temperature electrical equipment that is *smaller, safer* and *lighter.*

ELECTRO HI-TEMPERATURE FIBERGLAS* INSULATION has helped numerous manufacturers of motors, transformers and electronic equipment to do a better and safer insulating job. We would like the opportunity to help you. Send us your insulation problem or write to our Department E-1 for technical data and samples.

*T. M. REG. U. S. PAT. OFF. by Owens Corning Fiberglas Corp.

ELECTRO-TECHNICAL PRODUCTS
DIVISION OF NVF CHEMICAL CORPORATION
113 East Centre Street, Nutley 10, N. J.

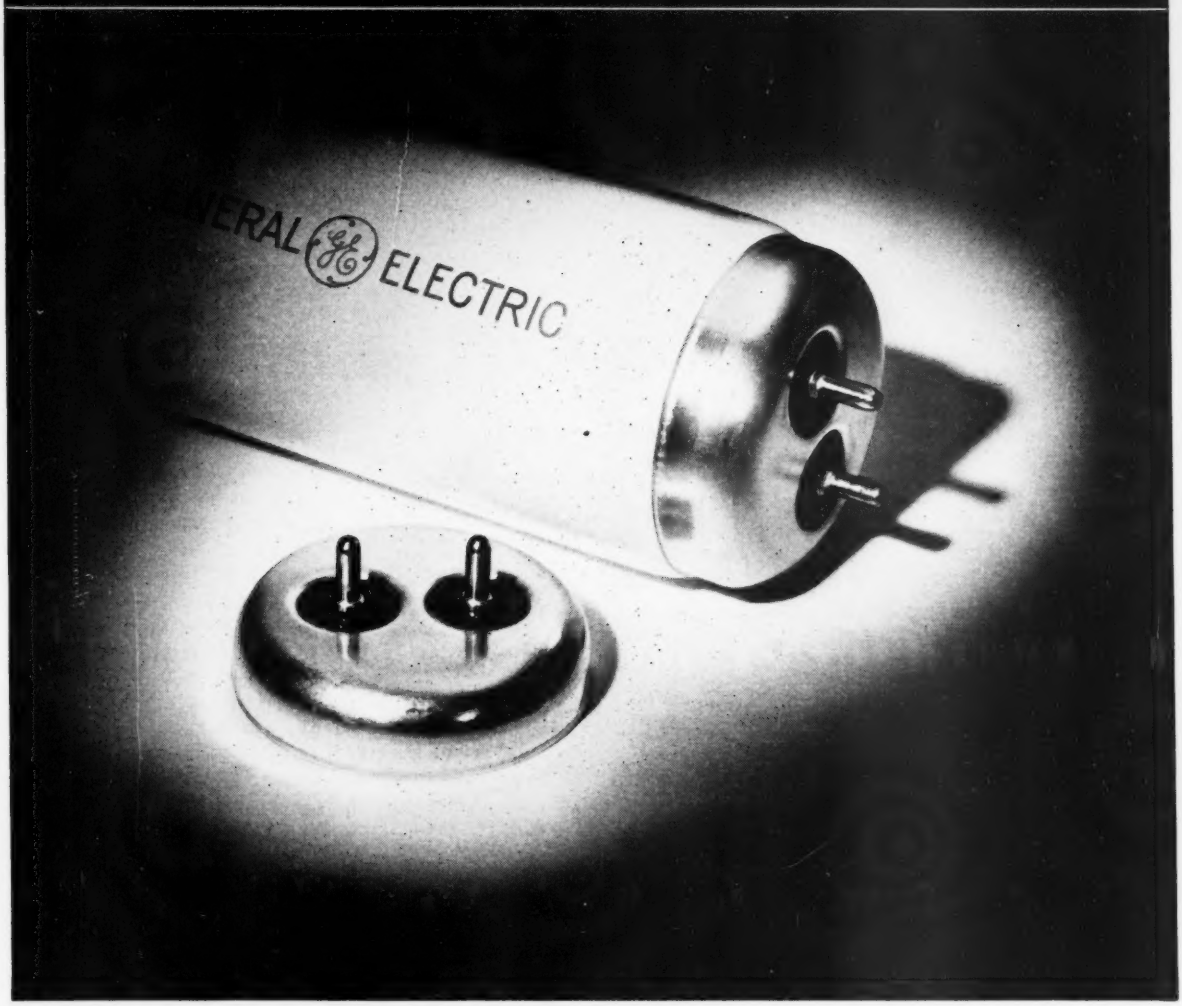
INDUSTRIAL BRIEFS

Heating plates with electric strip heaters does a better job of separating damp sand from them at the Canton Malleable Iron Co, Canton, Ohio. Formerly the aluminum plates were dusted with fine parting material. A higher percentage of satisfactory castings has been obtained and output per molder per day has appreciably increased. Sufficient heat is radiated by three 150-w strip heaters to warm each plate so that sand and plate readily separate. G. W. Craiglow, Industrial Power Eng., The Ohio Power Co, Canton, O.

New multicolor light source with color filter on the light source (instead of on camera lens) provides a better picture with sharper contrast and clearer definition at the Progress Lithographing Co, Cincinnati, Ohio. Two new rotary, multifixture type light sources replaced several arc lamps. Light sources consist of various colored slimline fluorescent lamps 72 in. long mounted vertically. Blue, pink, green and gold lamps are used to provide the various colors. Use of color filters on light source itself makes it possible to filter out any unwanted color component. When using arc lamps as the source of illumination for the new large camera, it was necessary to use a color filter over the camera lens. This resulted in some fuzziness of the picture. L. J. Langevin, Power Engineer, Cincinnati Gas & Electric Co.

Preheating hosiery material at Classic Hosiery Mills, Elizabethtown, Pa., by installation of 18-kw, automatically-controlled electric steam box, has cut mending costs 50%. Number of stockings needing repairs, due to picks, pulls, fish eyes, etc is cut 75%. Customer relations have improved which is helping to increase sales. Steam box automatically preheats material for desired time at accurately controlled temperature, humidifies goods at accurately controlled humidity, exhausts humidity from box after completion of humidification, drys goods inside box for definite time and circulates cool air through goods for predetermined time period before unloading. D. Clyde Oberholzer, Industrial Rep., Pennsylvania Power & Light Co, Lancaster, Pa.

You expect the best value from G-E fluorescent lamps



Rugged aluminum base helps G-E lamps last longer

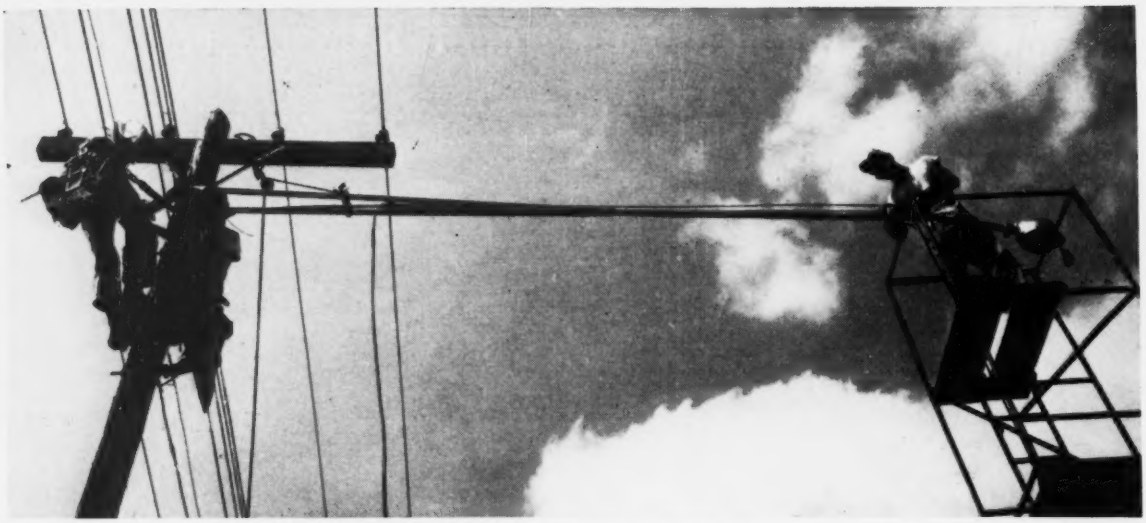
You've probably noticed that G-E fluorescent lamps now have bases made of a white shiny metal, instead of the usual yellow brass or black plastic. It's aluminum.

Aluminum is light and resilient. Won't crack from hard bumps and jolts. Can take the high heats needed to get the best seal between base and glass tube. Doesn't shrink at low temperatures, won't crack the glass tube in cold weather. It helps prevent failure in G-E lamps.

Five years of General Electric lamp research helped make this use of aluminum possible. It shows again why you and your customers can *expect* the best value from G-E fluorescent lamps.

You can put your confidence in—

GENERAL ELECTRIC



PUTTING UP lamps in Baton Rouge was speeded by employing a pre-assembled steel scaffold mounted on a trailer as . . .

Test Installation Sells Street Lighting

Gulf States Utilities Co hangs incandescent and mercury vapor lamps along stretch of highway to prove superiority of latter

A street lighting program that is returning big dividends in better highway illumination, fewer accidents, and public good will in Baton Rouge, La., is the result of engineered planning by Gulf States Utilities Co.

City officials had not been entirely sold on what type of lighting would prove best, or how extensive it should be.

But they became convinced shortly after a trial installation, one stretch with mercury vapor lamps and the other with 10,000 lumen incandescent. Mercury vapor was selected because of its lessened glare.

Another contributing factor was traffic accident figures recorded on heavily traveled Plant Rd, which showed a 60% drop, with no front-to-rear collisions.

The satisfactory results bore out the beliefs of Gulf States officials that the best way to sell a city on good street lighting is to install test stretches for demonstration.

Plans Changed . . . Original program called for 2,500 new lights; 1,800 of 2,500-lumen incandescent, 415 of 6,000-lumen incandescent, and 285 of 15,000-lumen mercury vapor lamps to be installed on new locations. The company then changed 833 old fixtures to 2,500 and 6,000-lumen lamps.

The mercury vapor lamps were installed on the three main highways leading into Baton Rouge. These proved so successful that the program was expanded to take in the other main highways with some 525 of the 15,000-lumen mercury lamps. Plans are being developed to install 500 more of the lamps, 100 of them along a 30-block stretch on the city's main street.

Hopeful Prospect . . . So sold has the city become on the new lighting that the company is now proposing to replace the 15,000-lumen and 20,000-lumen lamps. This is economically sound because the 15,000-lumen lamps give about 13,500 lumens, while the 20,000-lumen lamp will provide about 19,100 lumens. On this basis, the city will get over 45% more light at a cost of only $6 more per fixture.

The company has used football type fixtures at a 30-foot mounting height on 150-ft staggered spacing. They are on multiple circuits and controlled by photo cells. Arms vary in length but are such as to place the lamp on a 4-ft to 5-ft distance from the curb.

"Go All-Electric" Sales Promotion Launched by JCP&L

A new company-wide sales promotion program was announced recently by Fred I. Smith, sales manager for Jersey Central Power & Light Co, to approximately 275 electric appliance dealers, distributors, and manufacturers.

Using the theme "Go All-Electric," the utility launched the program to aid dealers to reach the appliance market and to bring the benefits of more electric convenience to its customers.

Population of the area served by JCP&L has increased 36% in the past 10 years as compared to 16% for the entire state. The company serves approximately 191,000 electric customers in all or parts of 10 counties in New Jersey.

The company program will aid the dealers in the promotion of sales through media of advertising, demonstrations, displays, sales training, and promotion allowances.

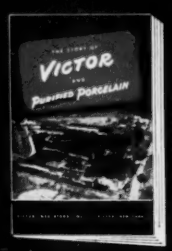
All dealers in the JCP&L service area were invited to participate in the program. Those who subscribe and meet the company's requirements are to be identified to the public as

IT TAKES MORE THAN THIS HAMMER BLOW TO INJURE

VICTOR PURIFIED PORCELAIN!

See that hammer falling? It's about to strike the outer edge of a Victor Suspension Insulator with a blow that *greatly exceeds specifications!* This is routine control procedure in Victor's test laboratories. It proves that insulators made of *Purified Porcelain* consistently withstand impacts in excess of NEMA standards. This finest porcelain ever made is more dense, harder, tougher and far more resistant to impact than any other porcelain yet developed. For full data on Victor Suspension Insulators, write for Bulletin No. 4.

Victor No. 900, 10" Suspension Insulator being subjected to impact test in Victor's Test Laboratories.



FREE BOOKLET gives you the full story on how Victor insulators are made—how and why *Purified Porcelain* was developed. Write us for your copy.

VICTOR NO. 900 SUSPENSION

Specify VICTOR INSULATORS!

VICTOR INSULATORS, INC., VICTOR, N. Y.

Low and High Voltage Pintypes • Suspensions • Guy Strains • Spools • Switch and Bus Insulators • Custom Designed Porcelain

When Life's at Stake Rely on...

KLEIN

Show the familiar Klein trademark to the old-timer on the pole and he'll tell you—"that's the equipment I've been using ever since I was a grunt."

Yes, workmen just naturally feel safer when the equipment is Klein—recognized for quality "Since 1857."

ASK YOUR SUPPLIER

Foreign Distributor: International Standard Electric Corp., New York.

Write for your free copy of the Klein Pocket Tool Guide today!

Since 1857

Mathias KLEIN & Sons

3200 BELMONT AVE. CHICAGO 18 ILL.

"Go All-Electric" Sales Meeting, one of a series at which Fred I. Smith, right, sales manager for Jersey Central Power & Light Co explained the company's new sales promotion program to dealers, manufacturers and distributors in its territory served. Smith was assisted by I. Maurice Stokes, left, company sales advertising and display manager.

"JCP&L authorized Reddy-Kilowatt dealers." Requirements for obtaining this identification are (1) that the dealer sell quality appliances, (2) that he provides the best service possible on appliances he sells, and (3) that he holds requisite manufacturers' franchises.

"He came in for some fuses, and I interested him in a few related items!"

Sell—and Sell—and Sell

Electrical World has been preaching "Sell—and Sell—and Sell" for many months. This cartoon, borrowed from Central Hudson Gas & Electric Corporation's "Dealer Doings," has the right idea.

COPPER or ALUMINUM

which conductor shall it be?

"I say COPPER"

"I say ALUMINUM"

"We both agree on ANACONDA"

It's not very strange that this sort of agreement is widespread today.

Cable customers vary in their needs. Some choose copper . . . some aluminum . . . some both.

To get the best results from either metal, consider carefully both sound engineering and good economics before deciding. Whatever *your* final choice—it will pay you to *specify Anaconda.*

Anaconda offers you a *single* source of supply for transmission and distribution conductors for every type of service. Modern manufacturing techniques are backed by many years of field-engineering and construction experience plus up-to-date metallurgical and development facilities. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y. B2476

Copper and Aluminum Insulated Cables
Copper and Aluminum Service Cables
Copper, Aluminum and Copperweld Bare and Weatherproof
Copper and ACSR Transmission and Distribution
Wire and Cable Accessories

cu or al

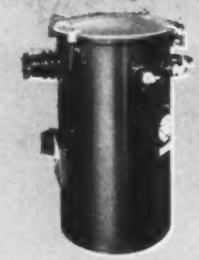
—choose with confidence when it's

ANACONDA® wire and cable

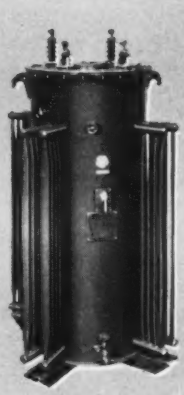
POLE STAR DISTRIBUTION TRANSFORMERS

Pole Star Distribution Transformers — 3 Kva through 500 Kva, 2400 through 67,000 volts

Protected Pole Star (CSP® Transformers) 3 Kva through 100 Kva 2400 through 14,400 volts



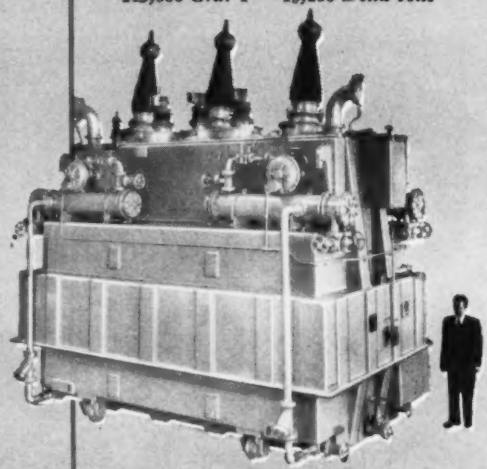
5 Kva Pole Star 2400/4160Y — 120/240 volts



500 Kva Pole Star 13,200 — 2400/4160Y volts

105,000 Kva; Three-phase

115,000 Grd. Y — 13,200 Delta volts

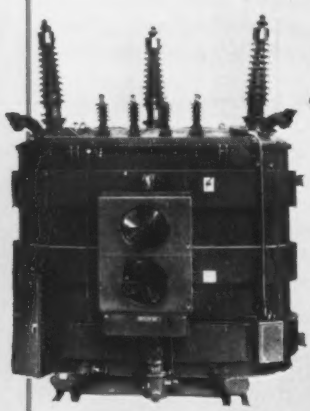


CONTOUR DESIGN

TRANSFORMERS...

PENNSYLVANIA TRANSFORMER COMPANY'S ONLY PRODUCT

CORE FORM POWER TRANSFORMERS



138,000 Volts

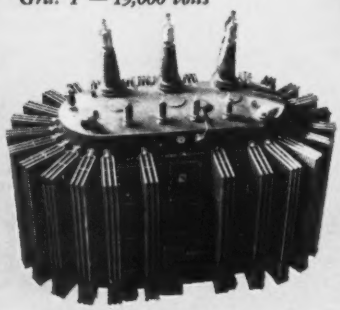
37,500 Kva, Three-phase 132,000 Grd. Y — 24,000Y/13,860 — 6900 Delta volts

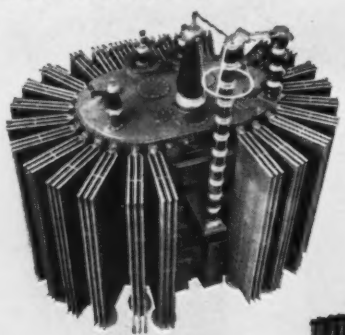
132,000 Volts

20,000 Kva, Three-phase, 132,000 Delta — 26,400Y/15,240 volts

161,000 Volts

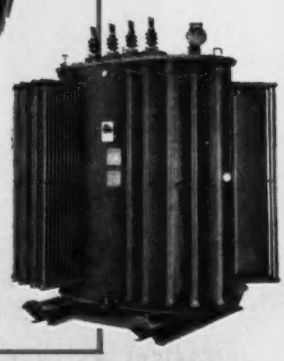
56,000/70,000 Kva, Single-phase. 93,000/161,000 Grd. Y — 19,000 volts

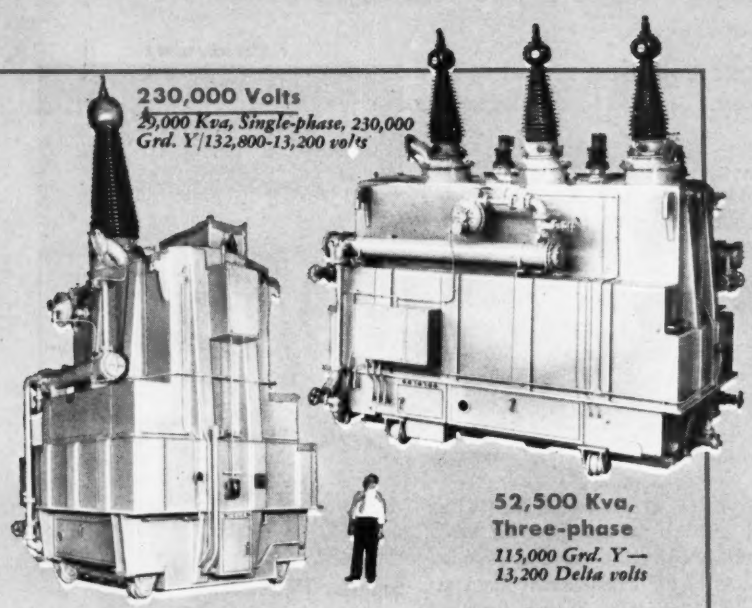




STANDARD PARTS POWER TRANSFORMERS

Three-phase: Up to 10,000 Kva, 34 Kv
Single-phase: Up to 5,000 Kva, 34 Kv

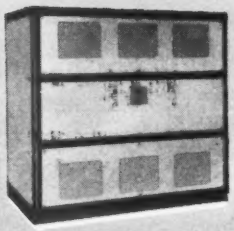




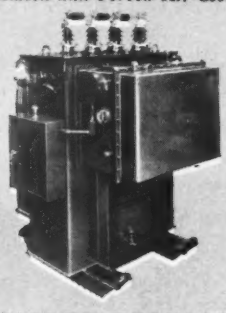
230,000 Volts
29,000 Kva, Single-phase, 230,000 Grd. Y/132,800-13,200 volts

52,500 Kva, Three-phase
115,000 Grd. Y— 13,200 Delta volts

SHELL FORM POWER TRANSFORMERS



DRY TYPE
Sealed, Ventilated and Forced-Air-Cooled



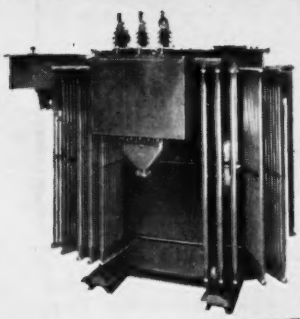
STEP VOLTAGE REGULATORS
Up to 750 Kva for plus or minus 10% regulation in 32 steps

DISTRIBUTION TRANSFORMERS
3 Kva through 500 Kva
Up to 67,000 volts

POWER TRANSFORMERS
750 Kva to 250,000 Kva
Up to 330,000 volts

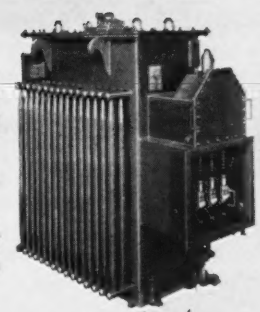
For 24 years, we have concentrated on designing and manufacturing one product — transformers. Each year we do more business than the previous year, and each year we keep bettering our product. We count among our customers the finest Utilities and Industrials in the country. We believe that if you are interested in transformers, you'll want to investigate Pennsylvania. We invite you to contact us.

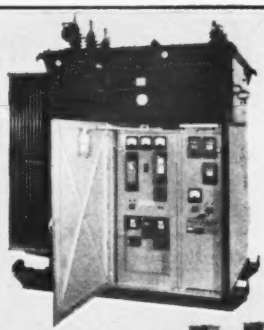
PENNSYLVANIA TRANSFORMER COMPANY
A McGraw Electric Company Division
CANONSBURG, PA. *Greater Pittsburgh District*



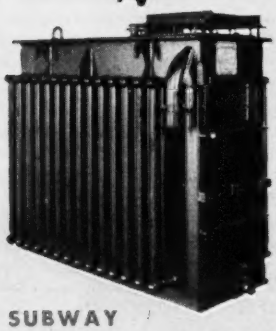
ASKAREL
Non-inflammable, liquid-filled Distribution and Power Sizes

NETWORK
300 through 1,000 Kva. 2400 through 34,400 volts

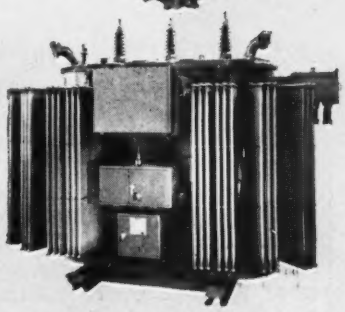




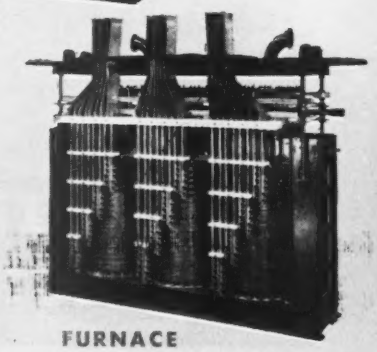
UNIT SUBSTATION
Single-Circuit and Duplex Unit Substations



SUBWAY
Submersible Type, Single and Three-phase



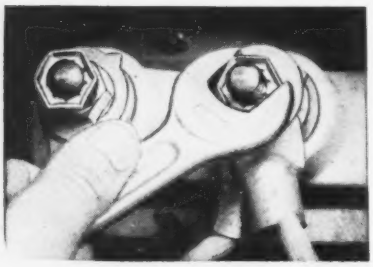
LOAD RATIO CONTROL
For changing transformer taps under load in sizes up to 50,000 Kva



FURNACE
For operating Electric Arc Furnaces of any tonnage

Assemblies stay tight!

Connections stay tight!



—when locked with PALNUT LOCK NUTS

FOR years, PALNUTS have been the standard lock nuts of the utility industry—on steel towers, wood pole hardware, connectors, disconnects, switches, fittings, transformers, etc. Here's why: PALNUT Lock Nuts stay tight under severest vibration, are very low in cost, apply fast and easily, require little space. Available in full range of sizes, in plain, Parkerized and Hot Dip Galvanized steel; also silicon bronze.

Samples and literature on request.

THE PALNUT COMPANY
51 Cordier Street,
Irvington 11, N. J.

PALNUT
TRADE MARK
LOCK NUTS
for quick, secure fastening at low cost

Street Lighting Standards Revised

Approval of revision of the 1947 "American Standard for Street and Highway Lighting" has been announced by the American Standards Association. As before, the Illuminating Engineering Society is authority for the revised and improved standard.

It clarifies types of light distribution to fit better the rectangular spaces involved in street width and spacing of lights. It contains more precise definitions of light distributions. Pictorial presentations are improved and new ones have been added.

Tables, giving mounting heights for lights and typical layouts, have been expanded to include mercury lamps, new and larger incandescent filament lamps, and new types of light distributors.

There has been no change in the illumination levels recomended but clarifying notes have been added to aid in the interpretation. The section on tree trimming has been expanded.

Soil Heating Cable Used In Two Types of Hot Beds

Nearly a million pepper plants are germinated in electrically equipped sash houses where the soil heating cable is set in concrete. This method of installation permits enclosed wiring with no damage to cables when pulling plants or removing soil.

An estimated 20 million sweet potato plants are started in outdoor electric hot beds where the heating cable is placed directly in the soil about 4-6 in. deep. Over 100 such installations are reported to be in Southern New Jersey.

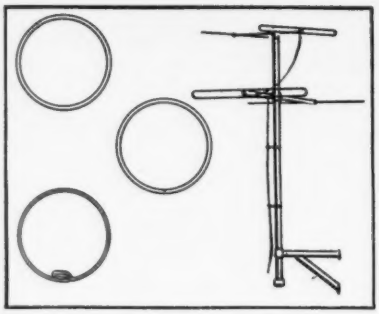
Soil heating cable is used to maintain even soil temperatures for other plants such as tomatoes and egg plants that require a carefully guarded germination period.

Heat Pump Office Set Up

A heat pump sales branch has been opened in Birmingham, Ala. by General Electric Co in line with its marketing development program for the new all-season air conditioner. The office-showroom is the first of a limited number of such branches to be opened throughout the country, according to H. M. Brundage, general manager of the heat pump department.

(Advertisement)

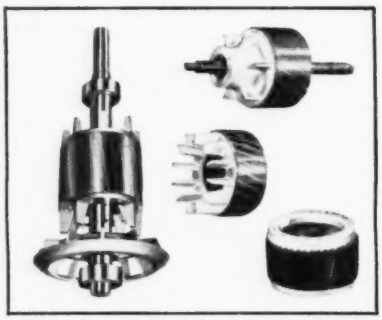
Electrical Applications of Aluminum



Superior TV Antennas

Check off what a television antenna requires—and you'll come up with an aluminum answer. Light weight, structural strength, excellent conductivity (pound for pound aluminum has double that of copper), freedom from rust and corrosion—these are a few of the aluminum advantages that are particularly important in TV antennas. Reynolds supplies many types of aluminum tubing as well as other forms of aluminum to manufacturers of antennas, masts and other electronic equipment.

Write to Reynolds at the address on the facing page for more complete information on the subjects above and also for details on the many other electrical applications of aluminum.



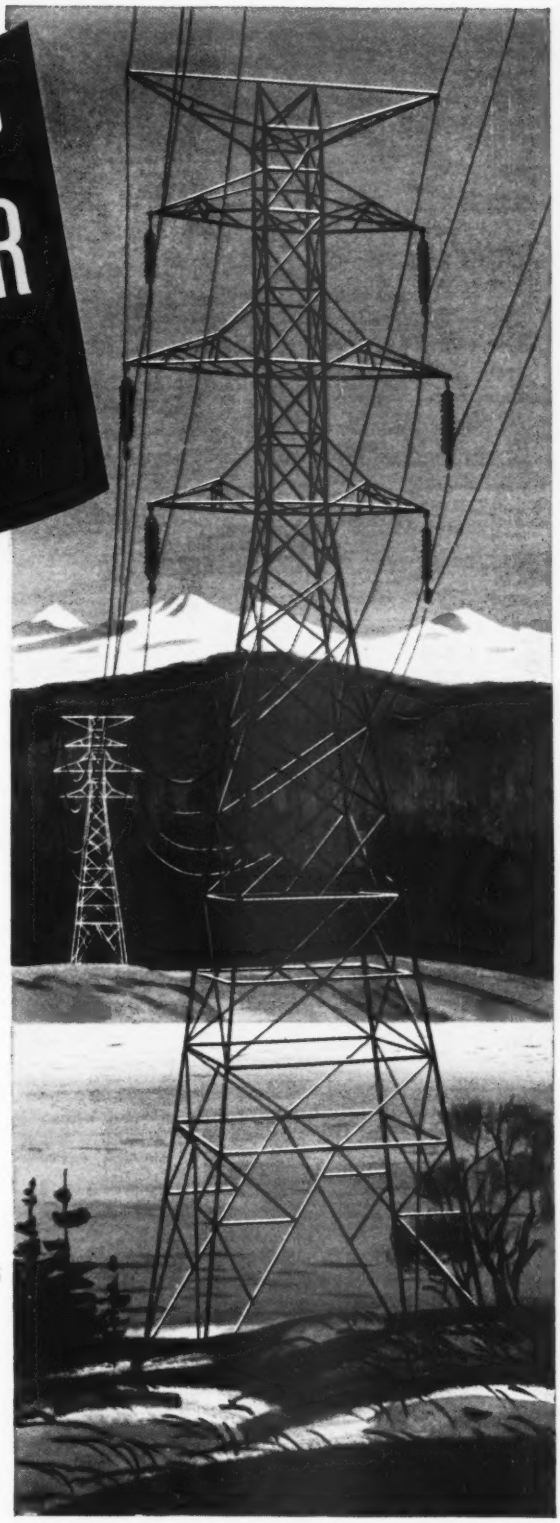
Better Motor Rotors

Many electric motor manufacturers are now die casting their rotors in aluminum. These rotors are not only excellent conductors of electricity, but the conductivity can be accurately controlled within close limits and at lower manufacturing cost.

The light weight of the aluminum rotors allows these motors to pick up fast. It also makes possible the casting of associated motor parts, such as fans, in a single piece with the rotor.

Aluminum is easy to cast. The metal follows and fills out complicated designs without leaving cavities or cracks. Reynolds furnishes aluminum rotor metal in aluminum pigs at various compositions.

ANOTHER RIVER EASILY CROSSED with REYNOLDS ACSR and REYNOLDS ELECTRICAL ENGINEERING SERVICE



A particularly difficult river crossing is just one of many examples where Reynolds Electrical Engineering Service can prove helpful. For example, Reynolds engineers recently had a river crossing problem presented to them by a Missouri Consulting engineering company*. Reynolds recommended the most suitable conductor size; suggested structure heights and clearances; prepared drawings showing position of conductor at 60°F. final; prepared special stringing sag tables for the conductors and for steel overhead ground wires with co-ordinated sag. These services, as well as others that may be required, are available without charge to Reynolds cable customers to help achieve the best in design and construction of overhead lines.

This experienced engineering service, plus the savings in original cost, handling costs and field costs offered by Reynolds ACSR, make a combination that is well worth looking into. Remember—Reynolds engineers will also be glad to meet with your men and present design and fabrication information on all electrical applications of aluminum.

*Name on request

ACSR MANUAL FOR ENGINEERS CONTAINS COMPLETE BASIC INFORMATION, CHARTS AND TABLES. This book is available without charge when requested on your business letterhead.

For information on specific problems

see your Reynolds distributors listed below
or write direct to Reynolds Metals Company
2584 South Third Street, Louisville 1, Kentucky.

A. A. Electric Supply, Chicago • California Electric Supply, San Francisco
General Electric Supply Co., Bridgeport (and branches) • Hendrie & Bolthoff, Denver
Hughes Electric Supply, Orlando • Maydwell & Hartzell, Inc., San Francisco
San Antonio Machine & Supply Co., San Antonio
Southern Electric Equipment Co., Atlanta • Chas. L. Ward Co., Kansas City, Mo.
Westinghouse Electric Supply Co., New York City (and branches)
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REYNOLDS ALUMINUM

MODERN DESIGN HAS ALUMINUM IN MIND

Glassheat
TRADE MARK

Salutes Your

Pioneer of **The First Multiple**

"OF COURSE IT'S

When you're in

ATLANTIC CITY

At The E. E. I. CONVENTION,

Don't Fail To See

The ALL-ELECTRIC Homes

in Northfield Subdivision,

Served By The

Atlantic City Electric Company

CONTINENTAL RADIANT GLASS HEATING CORPORATION

Progressive President, PAT ENGLAND

Home Project in the North

ALL ELECTRIC"

"Of course it's all electric!" Everything is electric — ranges, refrigerators, automatic laundries, and heating — GLASSHEAT by CONTINENTAL.

Most of you are acquainted with electric heating in *individual* homes.

Here's your chance to see an entire project with electric heating working perfectly in *every* home. Get the answers to your electric house heating questions direct from the people who use it... live with it... like it.

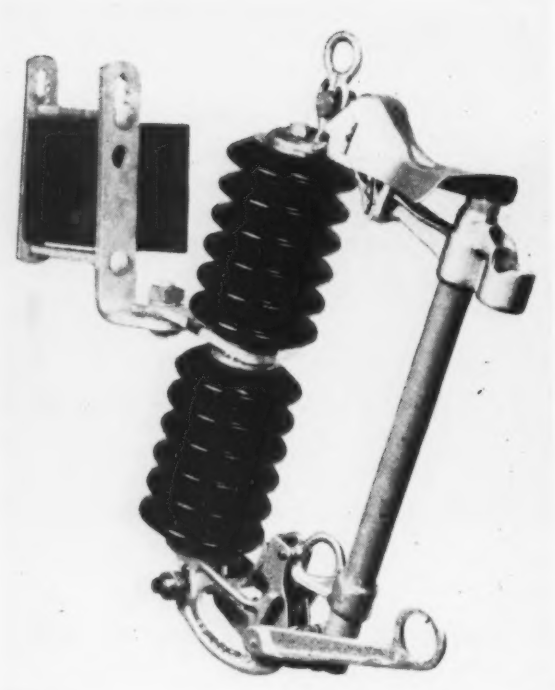
Transportation to and from Northfield Subdivision is FREE.

A fleet of cars—at least one at each hotel—will be waiting to take you on the short twenty minute trip to the project.

Don't miss it! Ask at your hotel desk for details.

This entire development is heated with GLASSHEAT automatically and has a control in each room.

ONE EAST 35th STREET, NEW YORK 16, N. Y.



Cutout

Type L-33-D affords operation up to its continuous current rating of 100 amp. By pulling the lever arm, the fuse link is broken within the tube causing fuse to operate. Cutout is said to feature controlled venting; gases created under heavy fault escape from both ends of tube.

It uses a conventional universal button head fuse link and is available in 5, 7.5 and 15-kv sizes, in current ratings of 100 amp, and in ratings of 2,500 and 4,000 amps.

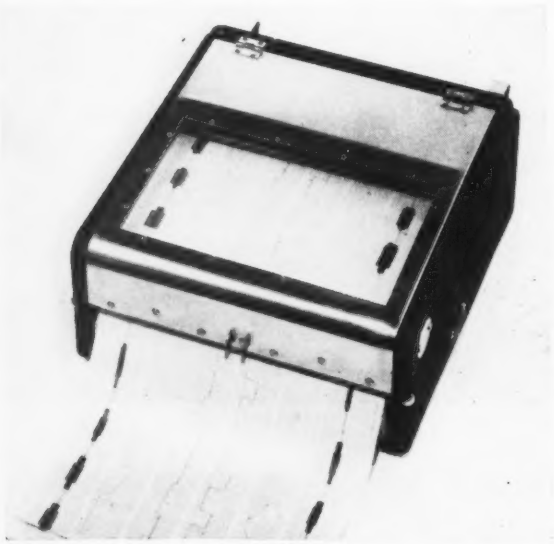
Southern States Equipment Corp, Hampton, Ga.

Digger

For digging holes ranging from 4 to 11 in. in diameter up to 6 ft deep, Hole-A-Minit, model 636S, is light weight and said to be one-man operated. An extension shaft is practical for digging beyond 6 ft deep. Blades are made of hardened carbon steel, it is claimed.

The unit will operate with any air drill equipped with standard Jacobs chuck or with a ½-in. or larger electric drill rated at 500 rpm or less.

Eugene John Freeman & Co, Van Nuys, Calif.



Portable Oscillograph

The model BL-226 is equipped with six penmotors for simultaneous recording of six variables. It is applicable where electrical signals are in the frequency range of dc to 100 cps.

Controls provide starting, stopping and selection of chart speeds of 5, 25 and 125 mm per sec. A 25-ft cable and junction box are used for necessary connections. Control from a remote location is accomplished with a remote control box.

Brush Electronics Co, Cleveland 14, Ohio

HOW LONG DO YOUR GROUND RODS LAST?

Safety Set Screw Clamp and Wrench
Numeral designates length of Rod
Cross section of ½-inch Hubbard-Copperweld Ground Rod showing approximate proportion of copper and steel
Square Head Bolt Clamp
Conical Swaged Point, no steel exposed

If They're HUBBARD-COPPERWELD You Know the Answer

The time-tested dependability and economy of Hubbard-Copperweld products have been proven in service for 36 years. The permanent Molten-Weld completely eliminates the possibility of harmful electro-galvanic action within the rod. There are no microscopic cracks, fissures, or pin holes in the thick copper exterior to admit moisture and give destructive rust a foothold.

For permanent grounding protection at lowest annual cost, insist upon Hubbard-Copperweld Ground Rods, with the rust resistance and conductance of copper plus the strength and easy-driving qualities of alloy steel.

Hubbard-Copperweld Ground Rods, R. E. A. item "TD-ai," and Ground Rod Clamps, R. E. A. item "TD-aj," are manufactured in all R. E. A. standard sizes.

HUBBARD AND COMPANY

ESTABLISHED 1843

PITTSBURGH • CHICAGO • OAKLAND, CALIFORNIA

"Hang the Load on Hubbard Hardware!"

for MODERN ... the CONDULET* method gives YOU

A modern installation of Condulets and rigid conduit is always ready for quick change-over to meet the needs of today's fast moving industry . . . without sacrificing the vital qualities of PROTECTION to electrical conductors and SAFETY to personnel, equipment, and the plant.

Only Crouse-Hinds sturdy cast Feraloy Condulets and rigid conduit can give you ALL of these 8 definite advantages:

1. **FLEXIBILITY.** A modern CONDULET installation provides for growth and changing conditions. CONDULETS with detachable hub plates can be used to make it easy to change circuits or add new ones.

2. **MECHANICAL PROTECTION.** Crouse-Hinds sturdy cast Feraloy CONDULETS and rigid conduit provide the best possible protection against accidental damage to the wiring and equipment. Prevents costly shutdowns.

3. **CORROSION RESISTING.** Cast Feraloy CONDULETS give the best protection wherever moisture, dust, or corrosive atmospheres are present.

*CONDULETS are made only by CROUSE-HINDS

Actual size photograph of a ¾-inch Obround Condulet. Sizes ½ to 6-inch A type for every purpose.

CONDULETS · TRAFFIC SIGNALS

WIRING and rigid conduit 8 BIG advantages

Complete Installation of a Conduit and Rigid Conduit System in a Modern Metal Working Plant

4 SAFETY. Ground continuity is of vital importance. CONDULETS with taper threaded hubs and rigid conduit with tapered threads make a secure joint that provides a reliable and permanent low resistance path to ground. This safety feature assures maximum protection against personal injury and fire.

5 UNIVERSAL APPLICATION. You can install galvanized CONDULETS and galvanized rigid conduit under all atmospheric conditions and in all occupancies.

6 ECONOMY. The installed cost of Crouse-Hinds CONDULETS and rigid conduit compares favorably with other wiring methods. The added advantages make it the really economical method that pays dividends over the years.

7 QUALITY. The trademark CONDULET stands for the highest quality, reliability, and long life.

8 VARIETY. More than 15,000 items are listed in the CONDULET Catalog, including a complete explosion-proof and dust-tight line for use in hazardous locations.

On YOUR next electrical layout, plan to get all the benefits of sturdy cast Feraloy CONDULETS and rigid conduit . . . the universal wiring method.

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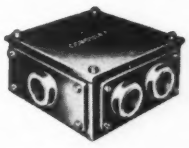
Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.

FS Series Condulets

GS Series Round Base Condulets



RS Series Junction Condulets Take Detachable Hub Plates

Form 8 Series Condulets Have Large Bodies

Arktite Plug Receptacles

V Series Vaportight Lighting Fixtures

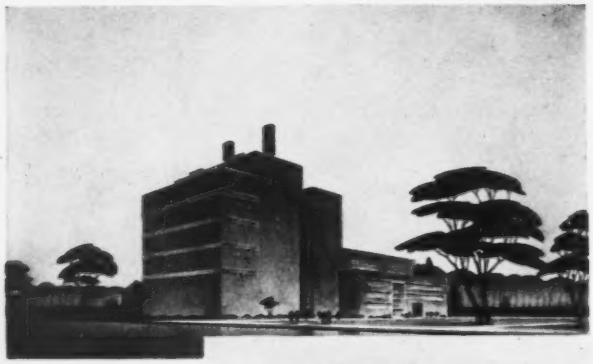
A Nationwide Distribution Through Electrical Wholesalers

AIRPORT LIGHTING • FLOODLIGHTS

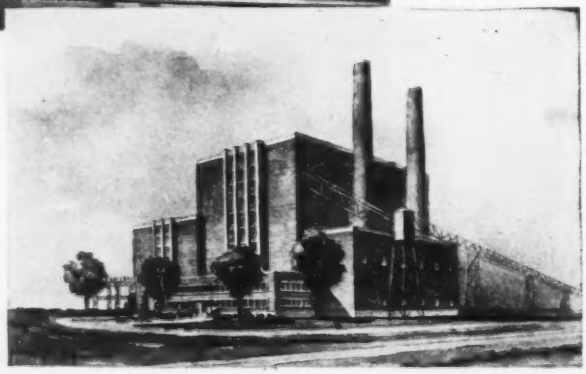
ON THESE TWO INSTALLATIONS

the AEROTEC SERIES

Assures 97.5% FLY ASH COLLECTION Efficiency



LEFT: The 264,000 kw (four units) J. Clark Keith Generating Station of The Hydro-Electric Power Commission of Ontario at Windsor, Canada. H. G. Acres & Co., Niagara Falls, Ontario, Consulting Engineers.

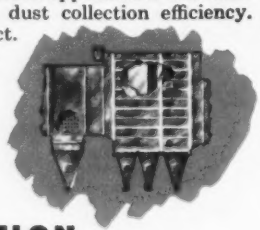


RIGHT: The 400,000 kw (four units) Richard L. Hearn Generating Station of The Hydro-Electric Power Commission of Ontario at Toronto, Canada. Stone & Webster Engineering Corp., Boston, Mass., Engineers and Constructors.

Here's on-the-job proof that Aerotec Series Mechanical-Electrical Dust Collectors are used for continuous efficiency. Guaranteed 97.5%, at normal full load the overall efficiency is anticipated as high as 99% at these two Canadian generating stations of The Hydro-Electric Power Commission of Ontario. Aerotec Series Collectors serving each plant combine a design 3RAS Mechanical and an Electrical Precipitator.

In the Mechanical unit, small diameter, permanent molded aluminum tubes provide high efficiency. Exclusive Aerotec pocket type collecting electrodes in the Electrical Precipitator reduce reentrainment of dust in the gas stream, contributing to a sharp improvement in stack appearance. The combined actions of these units assure maximum dust collection efficiency. Many Aerotec Series installations verify that fact.

Your plant can eliminate dust nuisances with Aerotec equipment just as many well-known companies have done. This highly successful performance is a reliable measure of Aerotec ability to solve your dust collection problems. Write our Project Engineers today!



Project Engineers

THE THERMIX CORPORATION

GREENWICH, CONNECTICUT

(Offices in 38 Principal Cities)

Canadian Affiliates: T. C. CHOWN, LTD.

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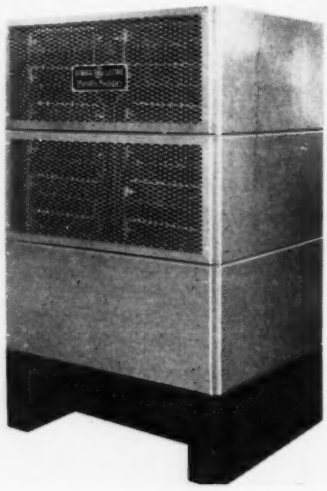
THE AEROTEC CORPORATION

GREENWICH, CONN.

Truck Bodies

For ¾- and 1-ton trucks, designed to save money and time for utility or contractor on rural pole line jobs. They include 16-gauge steel, electrically welded body with 18-gauge weather-tight doors and keyed locks; a derrick; winch and digger drive are integral parts. The built-in winch drive transmission gives rapid forward, neutral and reverse control, eliminating shifting the power take-off or use of truck clutch.

Tel-E-Lect Products, Inc, Minneapolis 16, Minn.

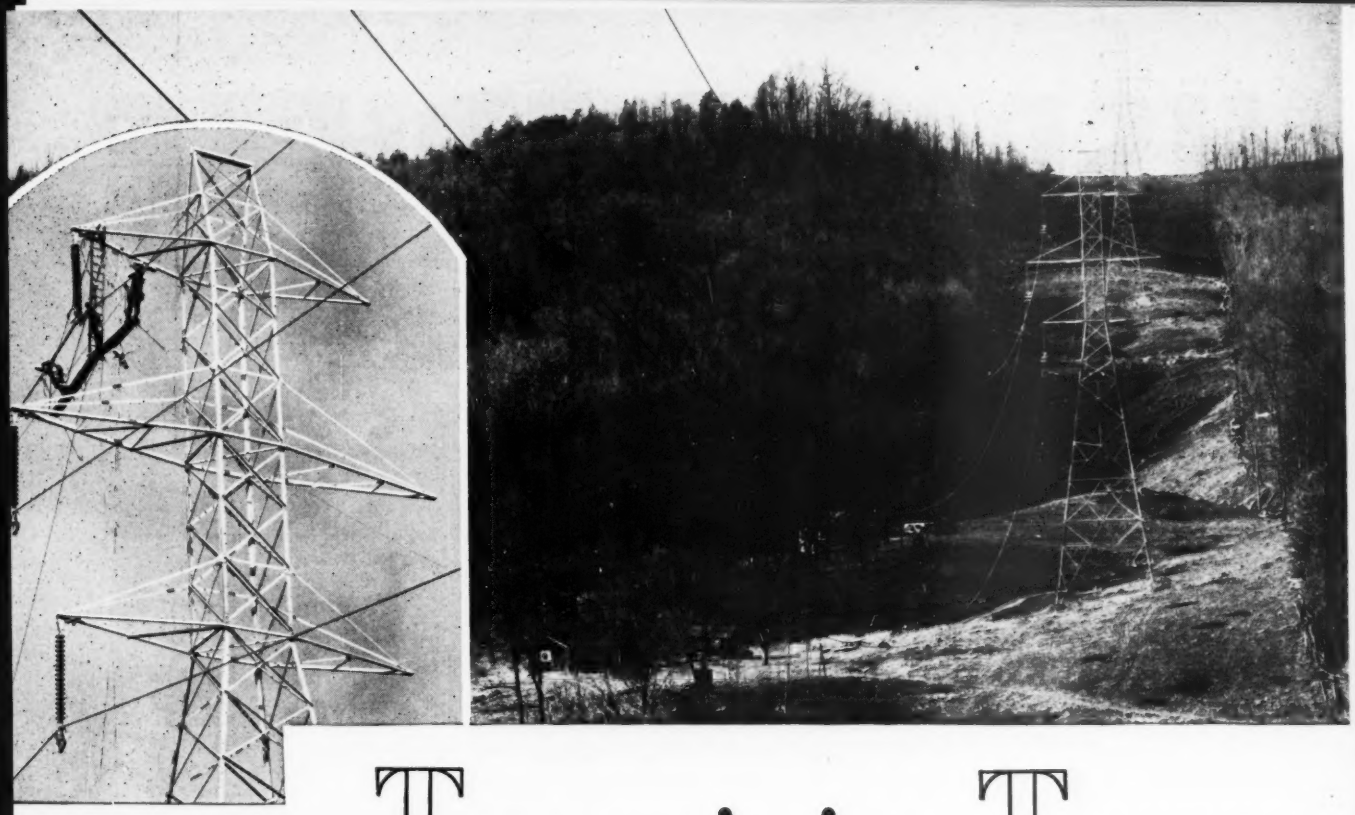


Metallic Rectifiers

The power supplies for electroplating and anodizing are manual or automatically regulated; special equipment is available for barrel plating and precision laboratory work. Manually controlled systems can be converted to automatic regulation by adding another component.

Made with copper-oxide or selenium rectifier stocks, the systems have a range from 500 amp at 6 v to 2,000

(*Continued on page* 220)



Transmission Towers

designed to carry any load ...to fit any terrain!

Recent high voltage line towers by AMERICAN BRIDGE

Appalachian Electric Power Co.
Ohio Power Company
Public Service Company of Indiana
Duquesne Light Company
Dayton Power and Light Company
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Detroit Edison Company
Toledo Edison Company
Idaho Power Company
Indiana & Michigan Electric Co.

AMERICAN BRIDGE steel towers carry many thousands of circuit-miles of transmission lines across this great land. Scaling the heights of rugged mountains; through marshy lowlands, traversing every conceivable kind of terrain, these steel transmission towers are helping make America's great power distribution system the world's best.

American Bridge towers are made to order for every type of transmission line service. They are designed for simplified erection on level, side-hill, or rocky butte sites. They are engineered for heavy-duty service under the severest climatic conditions.

Incorporating special design features such as steel grillage earth anchors and variable leg extensions, American Bridge towers make possible important savings in time, labor, and material costs.

The technical knowledge and experience American Bridge has acquired in more than fifty years of designing, fabricating and erecting towers may be just the answer to your problems. Our engineers welcome an opportunity to figure on your requirements. Just write our nearest office.

AMERICAN BRIDGE DIVISION, UNITED STATES STEEL CORPORATION
GENERAL OFFICES: 525 WILLIAM PENN PLACE, PITTSBURGH, PA.

Contracting Offices in: AMBRIDGE · ATLANTA · BALTIMORE · BIRMINGHAM · BOSTON · CHICAGO
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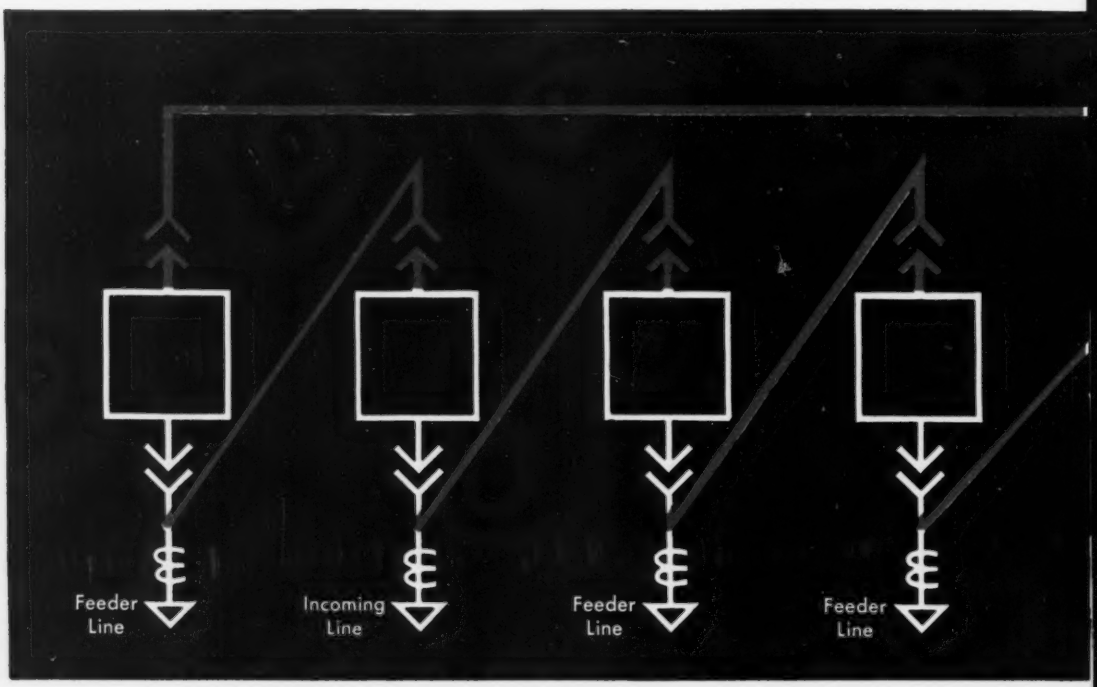
AMERICAN BRIDGE

USS TRADE MARK

UNITED STATES STEEL

USE A FLEXIBLE

Without the



No costly extra cubicles needed! Ring buses are built into standard units of Allis-Chalmers Metal-Clad Switchgear. This economy, together with their other advantages, makes ring bus schemes more attractive than ever.

Important Advantages

First, there's the flexibility of a ring bus as shown in the single line diagram above. For example, one breaker functions as both a feeder breaker and a bus tie breaker, and it is possible to feed each circuit from either of two breakers. In addition, a ring bus provides continuous service while a circuit breaker is taken out for routine maintenance.

While these advantages can be enjoyed with other circuit arrangements, additional equipment is usually required and it becomes too expensive. As a result, ring bus schemes are often overlooked. But with Allis-Chalmers switchgear a ring bus scheme is simple. The only change from standard construction is the diagonal bus from the front of one unit to the rear of the adjacent unit.

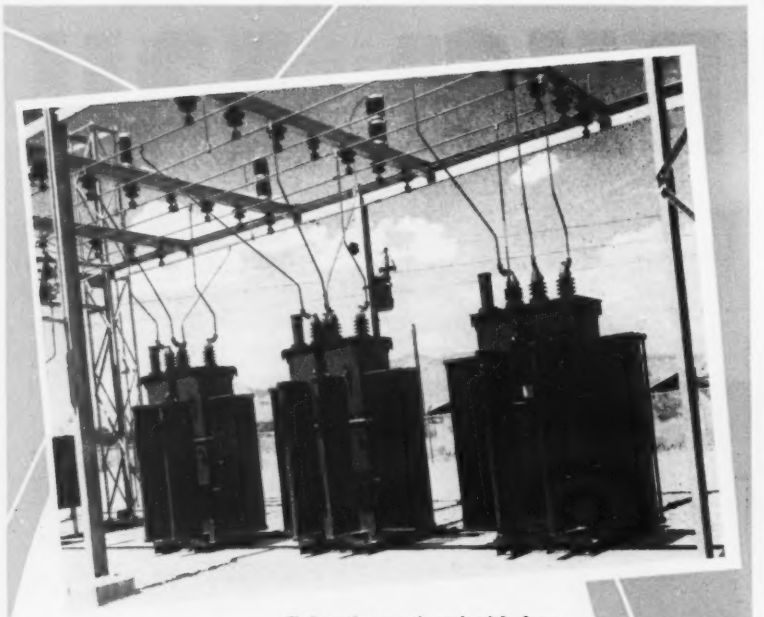
It's time you enjoy the flexibility of a ring bus with Allis-Chalmers switchgear — without the usual high cost.

Talk it over with an A-C engineer. Call your nearby A-C district office, or write Allis-Chalmers, Milwaukee 1, Wis.

A-3991

ALLIS-CHALMERS

RING BUS
Usual High Cost!



Substation equipped with three 1250 KVA single-phase Stockwell transformers.

EVERY STOCKWELL TRANSFORMER is the result of specialized research and sound design. Rigidly controlled materials and modern production facilities are additional guarantees of the quality of our products.

Our field organization and our staff of application engineers at Akron will be glad to help you on all your transformer and substation problems.

STOCKWELL

TRANSFORMERS

DESIGNED FOR YOUR REQUIREMENTS

STOCKWELL TRANSFORMER CORP.

AKRON, OHIO

OIL-FILLED, DRY TYPE, and ASKAREL-FILLED DISTRIBUTION AND POWER TRANSFORMERS

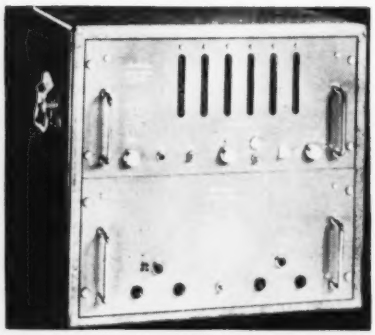
3-1

Rectifiers

(*Continued from page* 216)

amp at 48 v. Laboratory platers are rated 50 amp at 9 v and 65 amp at 18 v.

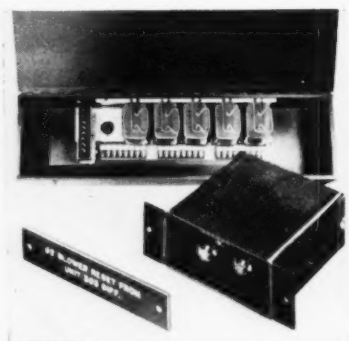
General Electric Co, Schenectady 5, N. Y.



Electronic Counter

Combined with an accurate time base to provide an instrument that will count and display the number of events that occur during a precise time interval. Events may be mechanical, electrical or optical occurrences that can be converted into changing voltages. The EPUT will count events occurring either regularly or with random distribution at rates of from 20 to 1,000,000 events per second with an accuracy of ± one count.

Beckman Instruments, Inc, Richmond, Calif.



Signal Units

The adapter unit permits remotely located visual trouble signals to operate as part of a plant-wide audio-visual annunciator system. For visual signals either illuminated nameplate units or bullseye lamps are furnished.

All signals connect to a common horn or bell, which must be acknowl-

RCA MICROWAVE

Over the years RCA MICROWAVE has proved it stays in service when you need communication most.

Most practical system, most complete service

To get the most from your microwave investment, check the record for downright dependability—and you'll specify RCA MICROWAVE.

For example, check the operating records of RCA MICROWAVE systems over the years. Check RCA's long history of successful operation through every kind of weather. Or check the numerous RCA installations that are now providing continuity of service in many applications. RCA can offer you a long working record of dependability.

For complete Service, check RCA's survey, construction, and installation facilities. They're complete single-source, single-responsibility service.

For more speed, for improved operation, check RCA Communication Equipment for your business. Contact your local RCA Regional Office for information, or *mail coupon now.*

Check RCA 2-way radio for downright dependability in mobile communications.

And remember, only RCA can provide the nationwide service facilities of the RCA Service Company.

RADIO CORPORATION of AMERICA
COMMUNICATIONS DIVISION **CAMDEN, N. J.**

Radio Corporation of America
Communications Division
Dept. 45QC, Building 15-1
Camden, N. J

Please send me your new, free booklet on:

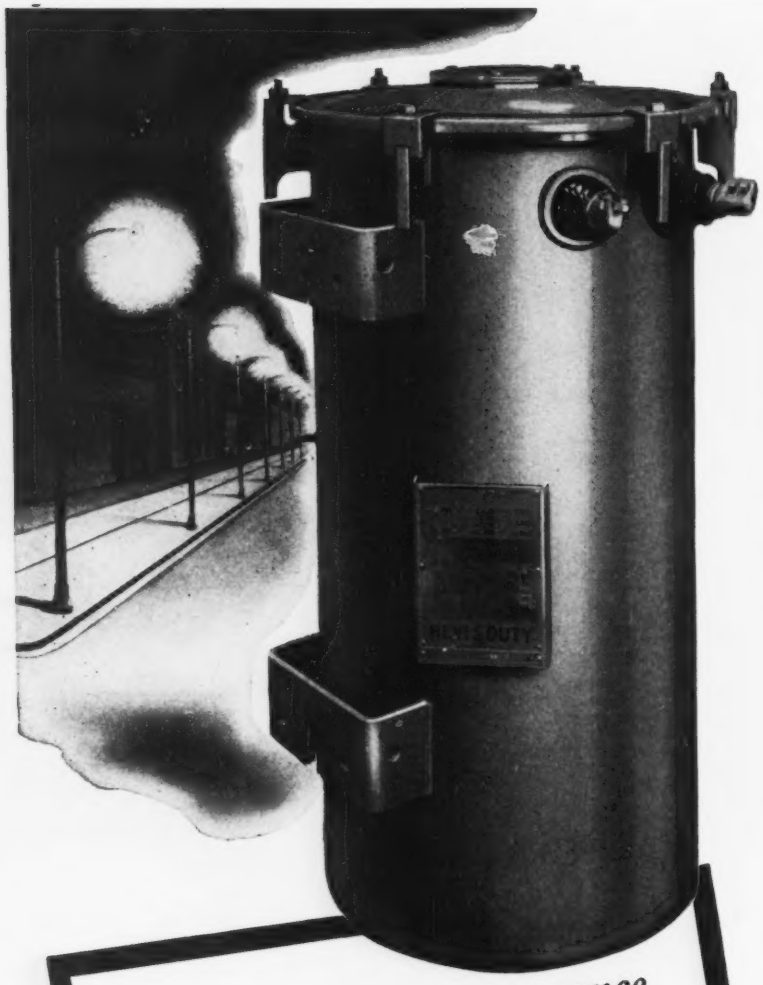
- ☐ RCA Microwave
- ☐ RCA 2-Way Radio

Name_____

Title_____ Company_____

Address_____

City_____ Zone_____ State_____



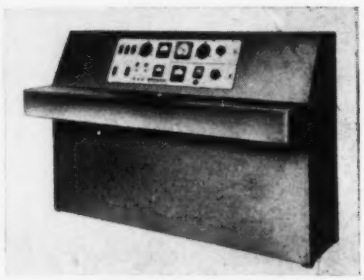
Street Lighting Maintenance
COSTS LESS
when you install HEVI DUTY
Constant Current Regulators

LAMP life is substantially improved when Hevi Duty Static Type Constant Current Regulators are used, because the resonant circuit with exclusive patented feature eliminates high inrush currents. Lamp maintenance costs are reduced. Write for Bulletin CCR-478.

HEVI DUTY ELECTRIC COMPANY
HEAT TREATING FURNACES HEVI-DUTY ELECTRIC EXCLUSIVELY
DRY TYPE TRANSFORMERS — CONSTANT CURRENT REGULATORS
MILWAUKEE 1, WISCONSIN

edged by the operator when an off-normal condition develops. Moving parts are enclosed in hermetically sealed plug-in units.

Panalarm Products, Inc, Chicago 40, Ill.



Power Source

Tesco is said to furnish stable, controlled, single-phase potential and current for general purpose testing. Means for adjusting phase angle are provided.

Dimensions of the apparatus are 80 in. long, 32 in. deep and 51 in. high. A 12- x 12-in. glass covered well in the bench top is provided for an indicating wattmeter.

Eastern Specialty Co, Philadelphia 40, Pa.

Safety Ramp

Designed for all car loading and unloading operations. The ramps are made from either light-weight magnesium or safety plate.

The flared ramps, 60 in. wide at the car door and 84 in. wide at the dock end, are made in 52 models. Capacities are 3,000, 6,000, 8,000 and 10,000 lb.

Penco Engineering Co, San Francisco 11, Calif.

Mercury Lamp

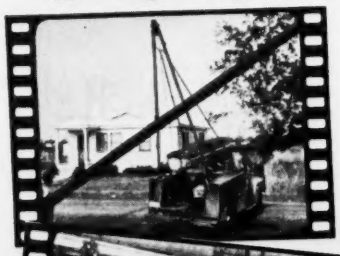
The 700-w fluorescent-mercury bulb provides 2½ times more white light without increasing power costs and is

(*Continued on page* 226)

Action!

This Versatile Body is the STAR OF THE FIELD

A leading performer in supporting roles, too!



POWERS *American*

Series 350

LIGHT DUTY MAINTENANCE BODY

Utilities everywhere award the Series 350 an "Oscar" for efficiency. This versatile unit enables a two-man crew to perform maintenance and installation work normally requiring additional men and vehicles. The compact, fold-over derrick sets 40′ poles—a job which would otherwise require costly heavy-duty equipment. There's a 24′ ladder which can be quickly erected for overhead work. Compartments are equipped to carry tools and materials for many service operations. The under-floor winch is always ready to use—without moving material load. No wonder the Series 350 has been acclaimed "the most versatile performer in the field."

more utilities use POWERS-AMERICAN bodies than any other make

CLIP THIS COUPON and attach to your letterhead

McCABE-POWERS AUTO BODY COMPANY, 5901 N. Broadway, St. Louis 15, Mo.
Please forward details on SERIES 350. *Also send information on the following:*

- ☐ LINE CONSTRUCTION BODIES
- ☐ GENERAL SERVICE BODIES
- ☐ REVOLVING AERIAL LADDERS
- ☐ WIRE REELS
- ☐ POLE TRAILERS
- ☐ HYDRAULIC TOWERS
- ☐ _____
- ☐ _____
- ☐ _____

Name_____

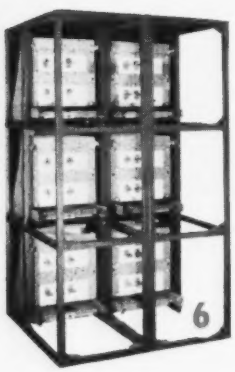
Company_____

Address_____

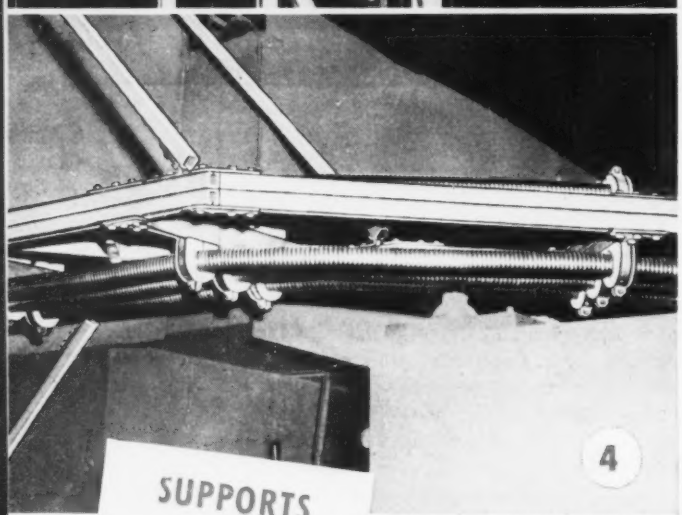
City_____ Zone_____ State_____

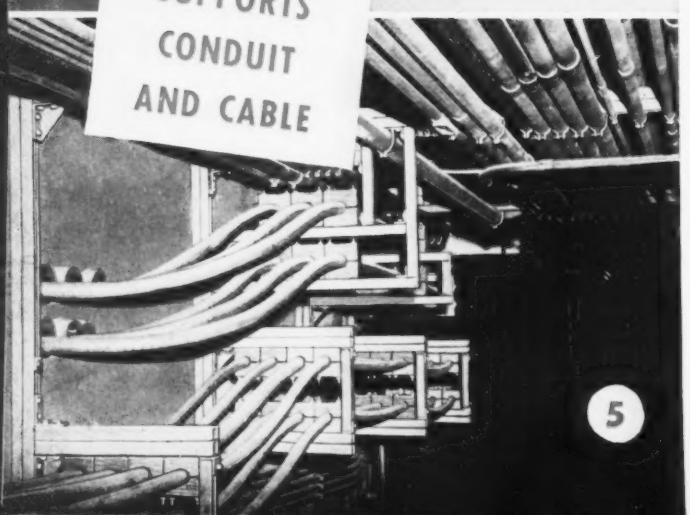
USE ADJUSTABLE UNISTRUT® METAL FRAMING TO MOUNT, FRAME, SUSPEND, SUPPORT ALL YOUR ELECTRICAL EQUIPMENT

quickly, easily, at low cost—
right on the job!



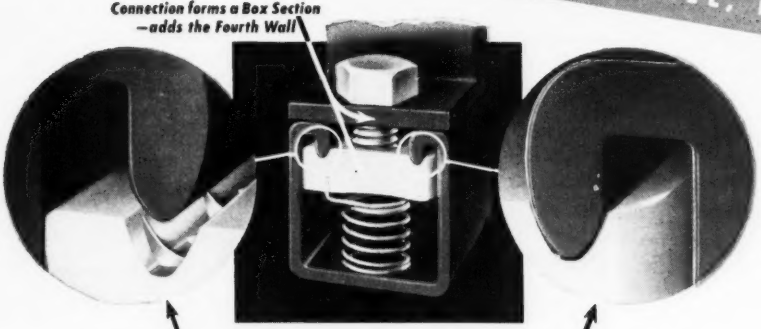
- **No welding, drilling, or punching**
- **Fast on-the-job assembly**
- **Reduces engineering detailing**
- **Eliminates errors**
- **Last minute changes easily made**
- **No waste—UNISTRUT is re-usable**





1. Showing portion of processing plant's motor control rooms with all control equipment supported by UNISTRUT channel, maple cable clamps and fittings.
2. UNISTRUT-supported fluorescent fixtures in machine shop. System provides perfect fixture alignment, added safety and better appearance.
3. UNISTRUT-supported heavy conduit run in large processing plant. UNISTRUT's extreme flexibility permits later additions or changes.
4. Bracing arrangement utilizes standard UNISTRUT channel and fittings in attaching the cable-supporting UNISTRUT framework to wall. Note porcelain insulating clamps.
5. UNISTRUT framing, porcelain and maple insulating cable clamps support cable and conduit.
6. Section of a draw-out switch cubicle completely framed with UNISTRUT channel and fittings.

This is UNISTRUT
the complete framing system



Hardened Nut has Corrugated Grooves which bite into Inturned Edges for Positive Clamping Action

Inturned Edges can't Buckle or Spread. Nut-to-Channel Locking Action holds Side Walls in Original Position

This Pyramid Shaped Edge has ⅓ more Bearing Surface than ordinary Flat-Edged Channel and Flat-Surfaced Nut

ONLY THE UNISTRUT FRAMING SYSTEM HAS THIS POSITIVE CLAMPING ACTION AT ALL POINTS OF CONNECTION!

Distributors and Warehouse Stocks in Principal Cities. Consult your Telephone Directories.

Write for NEW Free 84-page Pocket Catalog No. 800!

For the Man on the Job—packed with photos, drawings, ideas and data on how to frame, mount, rack and support electrical and mechanical equipment with UNISTRUT metal framing.

UNISTRUT Products are Bonderized

U. S. Patent Numbers
2327587 2329815 2345650
2363382 2380379 2405631
2541908 Other Patents Pending

See our complete Catalog in Sweet's 1953 Plant Engineering, Industrial Construction, and Architectural Files.

The World's Most Flexible All-Purpose Metal Framing

UNISTRUT PRODUCTS COMPANY
1013 W. Washington Blvd., Chicago 7, Ill., Dept W5

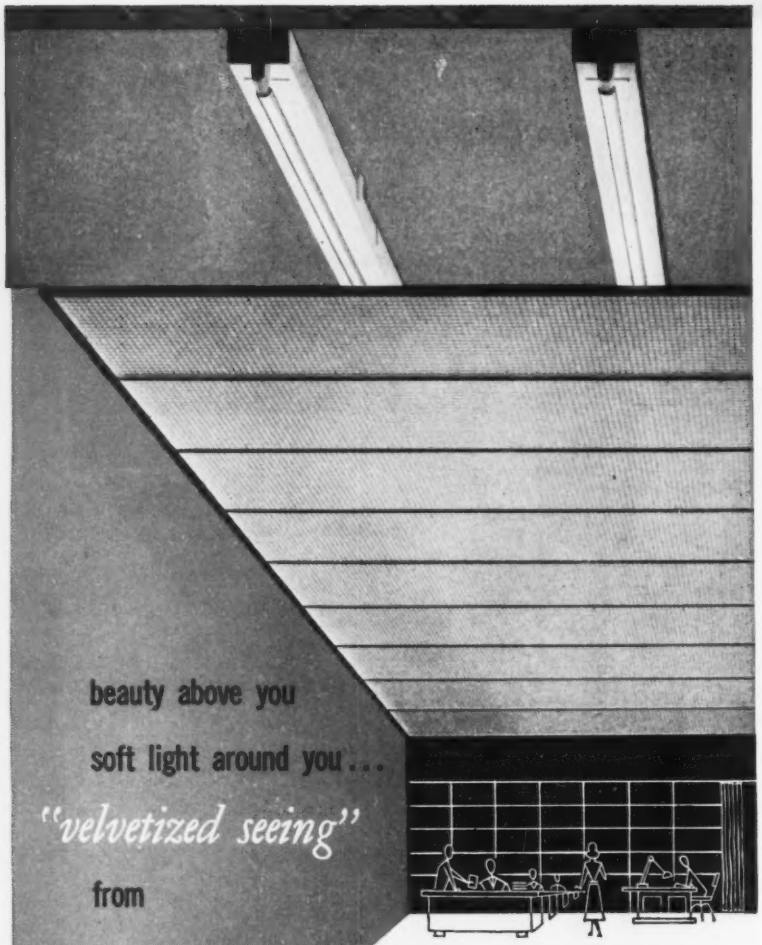
Please send me a copy of the new Catalog 800, without obligation.

Name_____

Company_____

Address_____

City_____ Zone____ State_____



beauty above you

soft light around you...

"velvetized seeing"

from

GUTH GRATELITE* CEILINGS

covered from wall to wall with GrateLite, the diffusing plastic louver . . . an architectural dream.

Diffusion through 3/8" translucent cubical facets produces finer quality illumination . . . fills the room with soft light for "VELVETIZED SEEING". It keeps your eyes "at rest" and makes your work easier.

simple installation: Just 5 parts to handle.

easy maintenance: Bugs and dirt drop through the lattice for minimum cleaning. Relamp by removing only 1 panel. Panels are detached and washed in 2 minutes.

start a new era of eye comfort—write today on your letterhead for folder 905-H and GrateLite layout guide.

Guth

THE EDWIN F. GUTH CO. ST. LOUIS 3, MO.

*U. S. & Can. Pats. Pend.
Trademark Registered

Lamp

(*Continued from page* 222)

for illuminating busy shopping streets. It is also claimed to have a 300% longer life than incandescent street lamps.

Structurally it is a lamp within a lamp. An inner mercury tube gives off a brilliant blue-green light and invisible ultra-violet rays. The invisible rays excite the phosphor coating on the outer bulb, making it fluoresce red. The combination of blue-greens hues with the red produces white light.

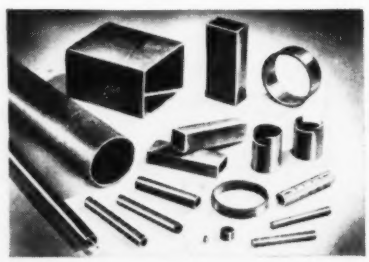
Westinghouse Electric Corp, Lamp Division, Bloomfield, N. J.

High-Current Tester

Industrial Multi-Amp, model 1010, is designed for checking and calibrating current actuated devices such as circuit breakers, overload relays, etc. It provides stepless increment control of five current ranges from zero to 500 amp. Input power required is up to 10 amp, 110 v, 60 cps. The unit weighs 60 lb.

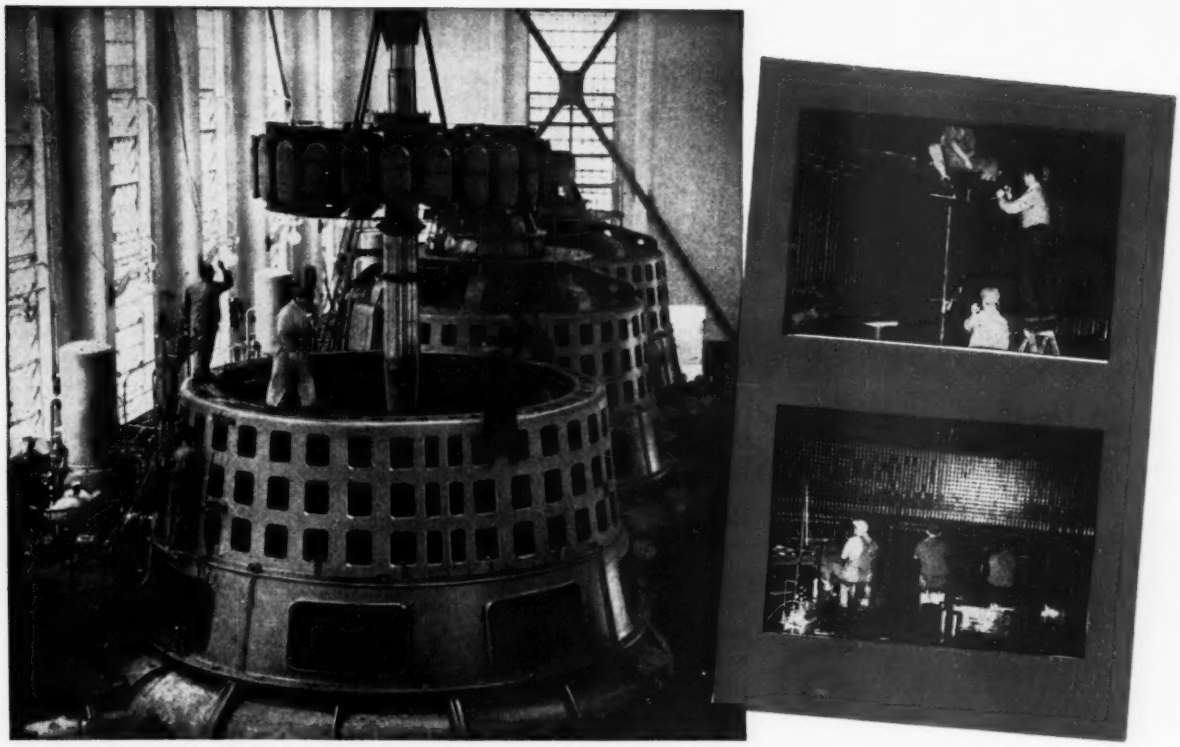
For testing, the current-actuated device is connected to the proper output terminals and current, read on a separate ammeter, is adjusted to the proper value.

Multi-Amp Corp, Harrison, N. J.



Tubing

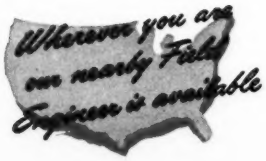
Resinite tubing is said to provide good wall and dielectric strength, and chemical and moisture resistance. Tubes are available in all shapes,



generator windings

with a *Longer* life span

Throughout the country, large generators are turning out more power as a result of National redesign work, National replacement windings and National rebuilding. In many cases, electrical characteristics have been changed to meet changed needs. In others, power output has been increased to meet increased demands. In still others, recurring trouble has been eliminated. In all cases, long life is assured. From the simplest replacement coil to the most complicated redesign job, National Electric Coil is dedicated not only to maintenance but also to *improvement*. When *any* piece of rotating electrical equipment presents a problem, communicate with National.



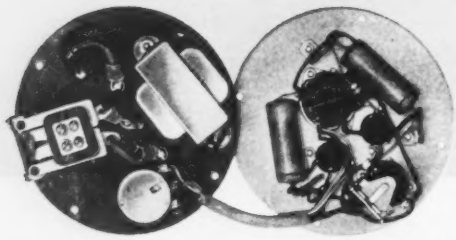
NATIONAL ELECTRIC COIL COMPANY

COLUMBUS 16, OHIO, U. S. A.

ELECTRICAL ENGINEERS: MAKERS OF ELECTRICAL COILS AND INSULATION—
REDESIGNING AND REPAIRING OF ROTATING ELECTRICAL MACHINES

Are you now using photoelectric street lighting controls?

—you should read this!



You Can Start a Replacement Program Now. The simplified Solatron "Patented Circuitry" is available on chassis to fit your present housings. 60% fewer parts mean inventory savings!

Meter-case Solatron features not only 60% fewer parts and 20,000 hour tubes, but assures true sensitivity over range of ½ to 8 ft. candles with chatterfree performance. 15 secs. time delay prevents activation via clouds or other transient conditions; Fail-Safe control switches light on in event of failure of any component!

Combining the Dependability of the meter-case model with a unique aluminum housing . . . the new Lighthouse Solatron is the finest of all photo-electric controls—the only control which can be mounted facing any direction!

Here's sorely needed help for municipalities, commissions and utilities harassed with the double-edged problem of rising costs and economy drives in budgets. The newly perfected Solatron controls strike at the root of maintenance costs by simplifying design and guaranteeing longer life! Yes, the Solatron has actually 60% fewer components than conventional controls in its "Patented Circuitry." Fewer parts also mean simplified inventory control. Solatron has upped tube life to over 3 years! — exhaustive tests show a minimum expected average of 20,000 hours' service without maintenance. These are just two major improvements you will want to know about. Just mail the coupon below for the Solatron "Spec Sheets."

COSTS NO MORE

What's more, in actual dollars and cents the **Solatron** will cost you NOTHING extra, either in extending your control system or as replacements. **Compare!**

SOLATRON

A Division of General Aviation Corporation

SOLATRON
540 EAST 80th STREET
NEW YORK 21, N. Y.

Without obligation to me—

☐ **Send Spec Sheets on Solatron photoelectric lighting controls**

☐ **Have your engineer call for an appointment**

Name_____

Address_____

EW

widths and lengths. Inner diameters range from 0.125 to 3 in., with wall thicknesses from 0.006 to 0.100 in.

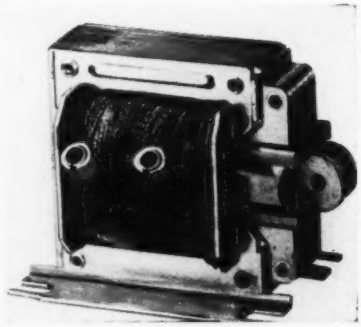
Three grades of tubing are available—punching, embossing and coil forming.

Precision Paper Tube Co, Chicago 47, Ill.

Cutting Tool

It is said to cut ACSR aluminum strands without damaging supporting steel core in a single cut, which leaves wire round and clean. Tools are made with hickory handles for ACSR sizes No. 6 to 4/0. Larger cutters up to 900 MCM are made with forged steel handles.

Interstate Drop Forge Co, Milwaukee 61, Wis.



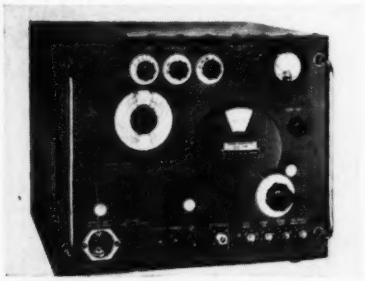
Solenoids

Featuring a replaceable coil, which can be changed by removing two spring clamps, the solenoids are available in two models. No. 230 is said to deliver about 6.5 in. lb. per stroke and No. 231, 9.5 in. lb. per stroke.

Field coil is moisture proofed.

Frame and plunger are cadmium plated. Dimensions of solenoids are 2 1/16 x 2 x 0.75 in., exclusive of mounting flanges.

Dormeyer Industries, Chicago 41, Ill.



Signal Generator

Model 618 B, designed for measurement of systems involving super high frequencies, is equipped with a reflex klystron oscillator for frequency generation. Accuracy and stability are claimed to be good throughout frequency range of 3,800 to 7,600 Mc.

It may be internally or externally pulse modulated. Repetition rate is variable from 40 to 4,000 pulses per sec. Pulse width is variable from 0.5 to 10 micro-seconds.

Hewlett-Packard Co, Palo Alto, Calif.

MORE NEW PRODUCTS
about which you should know

Russell & Stoll Co, Inc, New York, N. Y., announces a **signal alarm unit** to warn against abnormality occurring in a process . . . Industrial Tape Corp, New Brunswick, N. J., has an **electrical tape** for wrapping motors, generator and transformer windings that cures in one hr at 300 deg.

Arrow-Hart & Hegeman Electric Co, Hartford, Conn., announces a quiet mechanical **lamp switch.** It can be installed in any position and is safe for both incandescent and fluorescent lamps, it is claimed . . . U. S. Electrical Motors Inc, Los Angeles 54, Calif., has a new line of **variable speed motors** in ratings from ¼ to 50 hp featuring compact installations.

Eutectic Welding Alloys Corp, Flushing 58, N. Y., announces a **solder-paste combination** that is painted on the parts to be soldered. Heat is applied and joint is completed.

If you're planning improved street lighting

—be sure about this!

★ Wide-angle scanning

★ 60% fewer components

★ 20,000 hour tube life

★ "Fail-Safe" operation

★ Base or bracket mounts

Whether you plan to spend thousands or millions on new lighting—or just wish to improve your present street lighting system—one of the most important features you can incorporate is that of sensitive, positive lighting *control*. The finest plan for proper lighting is *meaningless* unless it calls for foolproof operation around the clock . . . sure provision that your lights will be on *when they are needed*.

That's why you'll want photoelectric controls as perfected by **Solatron**. Controls that cost no more than ordinary electronic types . . . less than some. They pay out their initial cost over the years in savings in *both* power and maintenance. Here's *why*:

Fact 1 . . . NO WASTED CURRENT . . . With **Solatron's** exclusive, wide angle scanning for super sensitivity . . . lights go on according to whatever degree of lighting you consider safe . . . the moment the light intensity falls below your pre-set minimum, lights go on, actuated by the local conditions. They are not turned on by inflexible time switches that may have become inaccurate due to power failures.

Fact 2 . . . LOW MAINTENANCE . . . No mechanical parts to fail . . . no maintenance crews required to adjust switches after a power failure. **Solatron** *guarantees* automatic light control so long as there is any power . . . and goes back on the job as soon as power is restored.

Fact 3 . . . ADDITIONAL SAVINGS . . . The simplified design of **Solatron's** "Patented Circuitry" further cuts maintenance. There are 60% fewer resistors and condensers in the Solatron . . . less parts to fail, easier inventory. What's more, exhaustive tests prove a minimum of 3-year's life for **Solatron** vacuum tubes . . . without maintenance!

Fact 4 . . . MAXIMUM SAFETY **Solatron's** "fail-safe" feature guarantees that lights will be on so long as power is on. Solatron-controls turn lights on in event of component failure.

Get the full story on Solatron perfected photoelectric street lighting controls. Just fill out the coupon below.

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540 EAST 80th STREET
NEW YORK 21, N. Y.

Without obligation to me—

☐ **Send Spec Sheets on Solatron photoelectric lighting controls**

☐ **Have your engineer call for an appointment**

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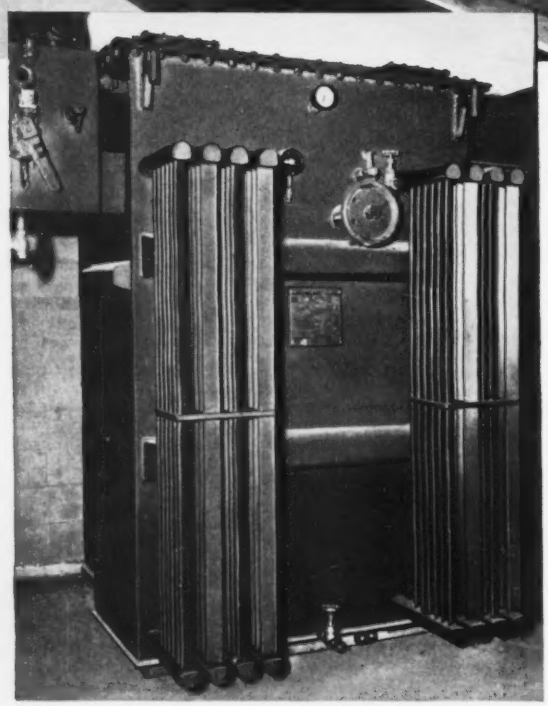


1000 kva, liquid-filled unit substation transformer, one of seven, installed at the New Brunswick, New Jersey, plant of the Studebaker Corporation.

The importance of the transformers in your plant power distribution system cannot be overemphasized. If a switch or a circuit breaker fails, only a part of the system is affected—but if the *transformer* fails, the entire system is dead. When you specify Wagner, you can be sure of a dependable, continuous flow of power.

Wagner Unit Substation Transformers, both liquid-filled and dry-type, are carefully designed to meet distribution requirements. Both liquid-filled and dry-type unit substation transformers are built in ratings through 2000 kva, 15 kv and below—you can choose the type and rating that exactly meets your load-center distribution requirements.

Bulletins TU-13 and TU-56 give full information. Your nearby Wagner engineer can help you solve your load-center problems. Call the nearest of our 32 branch offices, or write us.

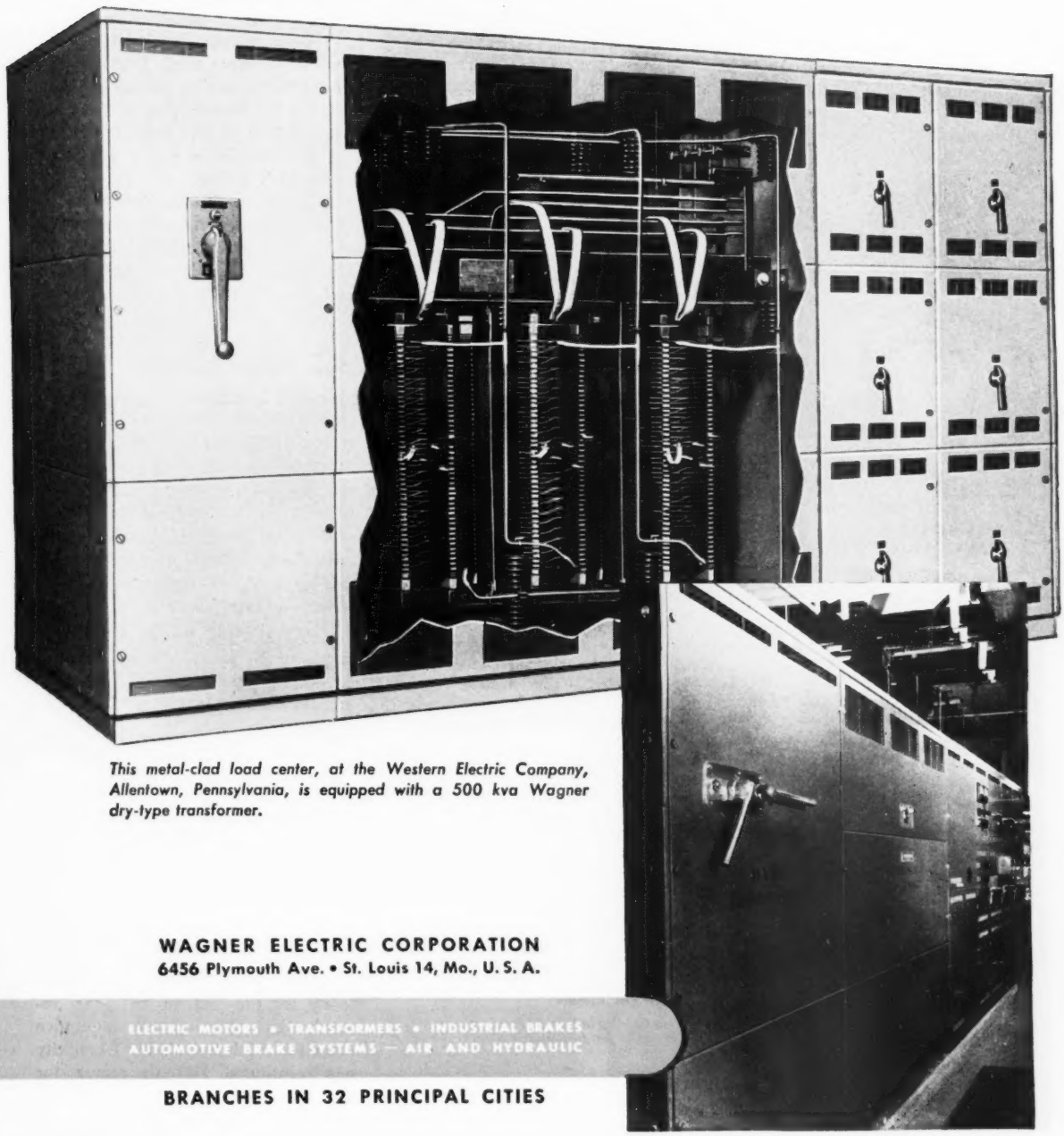
® Wagner Electric Corporation
EST 1891

T53-11

. Don't take transformers for granted

Specify Wagner Unit Substation Transformers

for dependable load-center distribution



This metal-clad load center, at the Western Electric Company, Allentown, Pennsylvania, is equipped with a 500 kva Wagner dry-type transformer.

WAGNER ELECTRIC CORPORATION
6456 Plymouth Ave. • St. Louis 14, Mo., U. S. A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

BURIED, SOAKED, FROZEN AND FORGOTTEN

because they work!

RUBBER ENCASED RUNWAY LIGHTING TRANSFORMER

Case and leads molded as a unit—core and coil assembly inserted, compound added, base vulcanized in place. *No damaging pressure is applied to core and coil assembly.* Unit has passed Army Air Corps tests and is approved by CAA under specifications L-833, L-834 and L-835.

LEAVE YOUR PROBLEMS AT JEFFERSON—GET TRANSFORMERS YOU CAN INSTALL AND FORGET!

Whether the transformer you want must be buried in the earth or inside a machine or electronic device is of little consequence. The vital factor is *performance to your specifications* regardless of obstacles.

The skill and resourcefulness of Jefferson Transformer Engineers are available to design transformers for your specific needs. Special as your problem may seem, chances are good that Jefferson Engineers have solved it during the 35 years of designing and producing millions of transformers for thousands of purposes.

Jefferson is ready to turn out small lots of experimental transformers in pilot plant production or large numbers in regular production. Complete facilities are available for high quality manufacture of hermetically sealed transformers which may require oil filling, sealing under vacuum, fungus proofing, five cycle and salt spray testing and other special requirements. Jefferson is equipped to meet military specifications such as AN-T-7, MIL-T-27, JAN-T-27, AN-E-19, MIL-T-16315A and MIL-T-7641.

SPECIAL TRANSFORMERS
- Radar
- Gunfire Control
- Hermetically Sealed
- Plastic Covered
- Cased in rubber

SEMI-STANDARD TRANSFORMERS
- Airport Lighting
- Radio and Electronic Transformers and Reactors
- Audio Filters and Reactors
- Low Voltage
- Variable Voltage

STANDARD TRANSFORMERS
- Ignition
- Luminous Tube
- Power Circuit
- Fluorescent Ballasts
- Mercury Vapor Lighting
- Industrial Control & Signaling
- Street Lighting

JEFFERSON ELECTRIC COMPANY
Bellwood, Illinois

Refer to Jefferson Catalog in Sweet's Product Design File, or write for full information.

Jefferson Transformers

WHAT THEY'RE SAYING

At Industry's Meetings

Television for Business

HERBERT E. TAYLOR, manager, television transmitter division, Allen B. Du Mont Laboratories Inc at Lubbock, Texas

The use of closed circuit television by American business and industry can easily become more widespread and important in the future than television in the home.

While use of industrial television today is only a small fraction of the over-all telecasting operation, its use is already spread over a sufficiently varied field to give a good indication of the all-inclusive role it will play in America's future.

Closed circuit television looms as a business, scientific and industrial tool whose potential is limited only by the imagination and foresight of those who use it.

Sale Causes Reaction

THOMAS G. DEGNAN, president, Boston Edison Co before the company's Merchandising Group at Boston, Mass.

Every time that an electric appliance is sold a chain reaction begins that affects the daily activities of every one of us in the company and even goes back as far as the worker in the mines or oil fields. Ours is a vital industry, and we should feel justly proud in being a part of it.

Regional Dream for Utilities

ALBERT A. CREE, president Central Vermont Public Service Corp and chairman, Electric Co-ordinating Committee of New England, before the Advertising Club at Boston, Mass.

Electric power has become the greatest force in lifting the American standard of living to heights that are the envy of the rest of the world. This great picture was not painted by bureaucrats of the budding Federal power trust but by free men working solely for the acclaim and other rewards which a free people would give them for a job well done. Electricity has substituted kilowatt power for muscle power. It has made possible

(*Continued on page* 236)

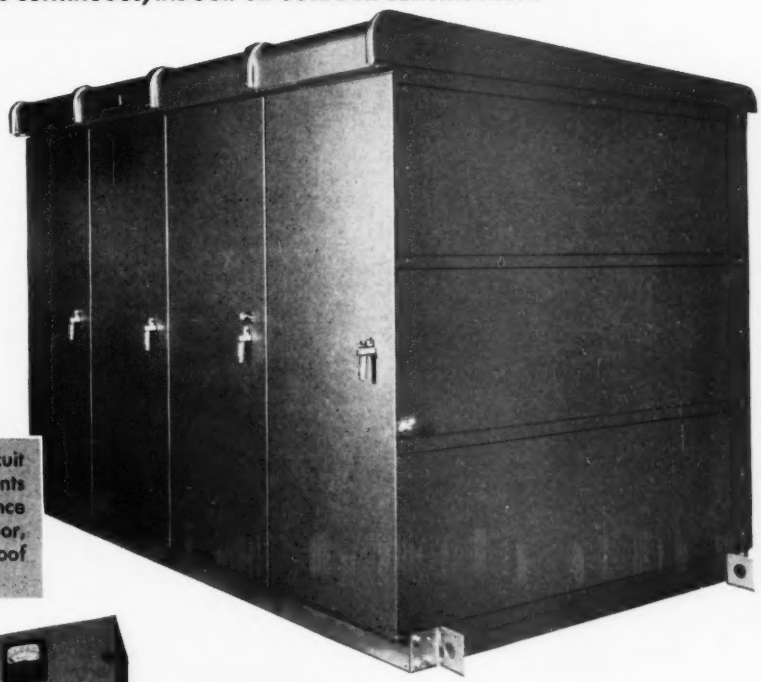
THE MODERN

STANDARDIZED, VERTICAL LIFT, METAL-CLAD, OIL CIRCUIT BREAKER SWITCHGEAR

2300, 4160, 4800, 7200 & 13,800 VOLTS; 50 TO 500 MVA INTERRUPTING CAPACITY; 600—1200 AMPERES CONTINUOUS; INDOOR OR OUTDOOR CONSTRUCTION.

STANDARD BASIC UNITS INCLUDE:

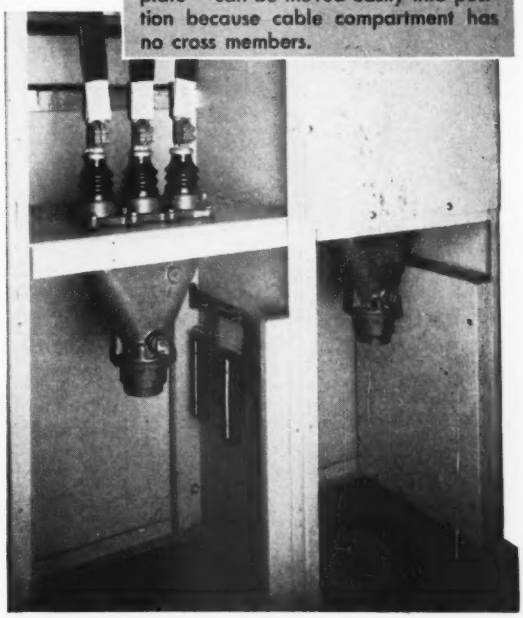
1) Swinging instrument panel; 2) Generator control; 3) Exciter control for generator; 4) Totalizing, metering and ground detection; 5) Incoming line; 6) Feeder; 7) Induction motor—full voltage starting; 8) Induction motor—reduced voltage starting; 9) Synchronous motor—full voltage starting; 10) Synchronous motor—reduced voltage starting; 11) Bus sectionalizing; 12) Auxiliary compartment and bus entrance; 13) Auxiliary compartment—miscellaneous equipment; 14) Air or oil isolator; 15) Bus entrance compartment.



THE MODERN Oil Circuit Breaker Switchgear presents a trim, handsome appearance as illustrated by this outdoor, unit-constructed, weatherproof assembly.

THE MODERN Oil Circuit Breaker Switchgear permits ready removal of oil circuit breaker — without use of transfer dollies.

THE MODERN Oil Circuit Breaker Switchgear has ample and accessible secondary connections — is rendered vermin-proof by pothead mounting plate — can be moved easily into position because cable compartment has no cross members.



Write for additional information

NELSON *Electric* MANUFACTURING CO.
TULSA, OKLAHOMA

217 N. DETROIT AVE. TELEPHONE 2-5131

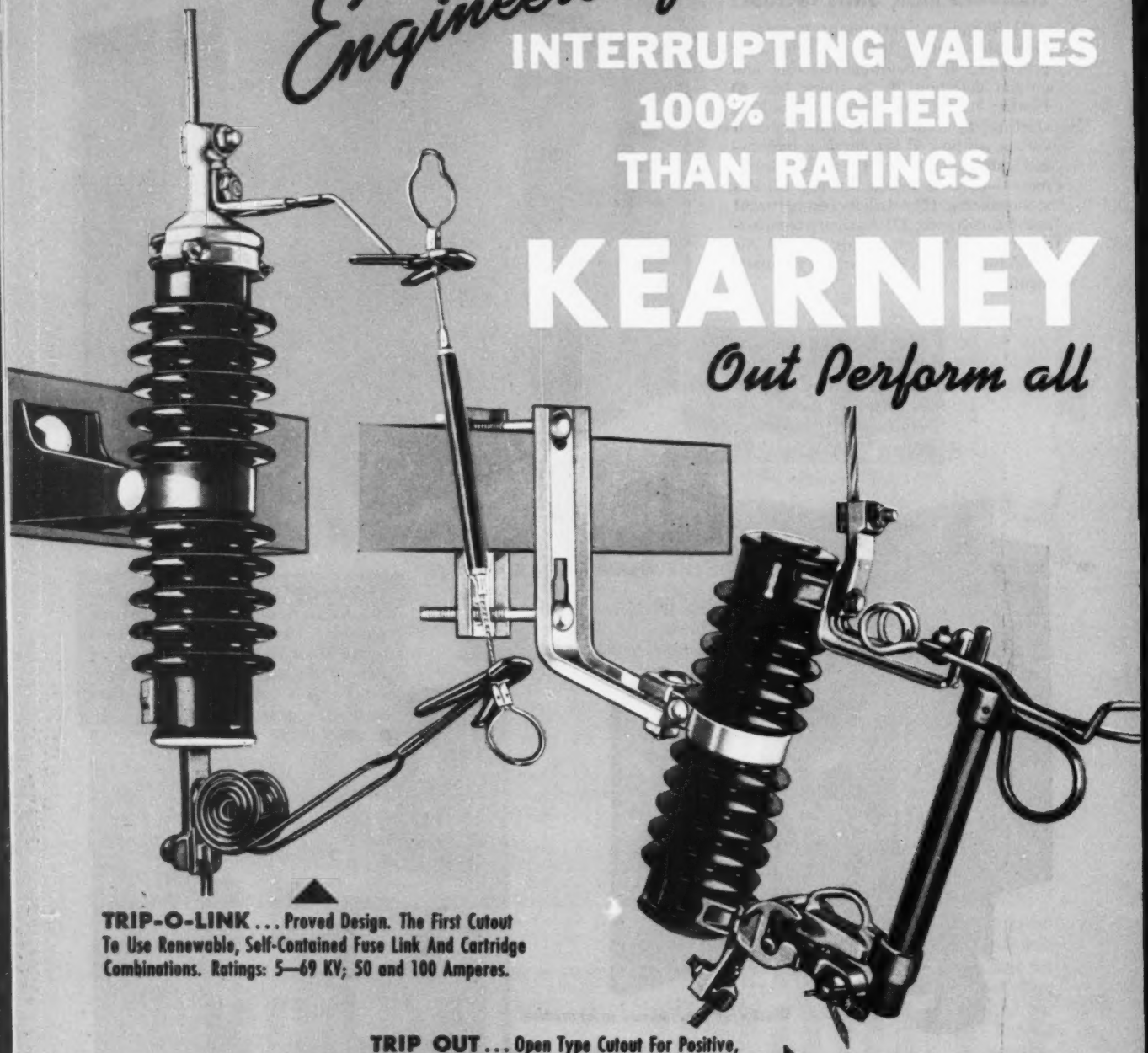
4 Leaders in the Field of PRIMARY PROTECTION

Engineered for

INTERRUPTING VALUES 100% HIGHER THAN RATINGS

KEARNEY

Out Perform all



TRIP-O-LINK . . . Proved Design. The First Cutout To Use Renewable, Self-Contained Fuse Link And Cartridge Combinations. Ratings: 5—69 KV; 50 and 100 Amperes.

TRIP OUT . . . Open Type Cutout For Positive, All-Weather Performance At Sustained, Full-Rated Load. Ratings: 5—69 KV; 100 and 200 Amperes.

Specify **KEARNEY PRODUCTS**

FOR BETTER CONSTRUCTION • SAFER MAINTENANCE

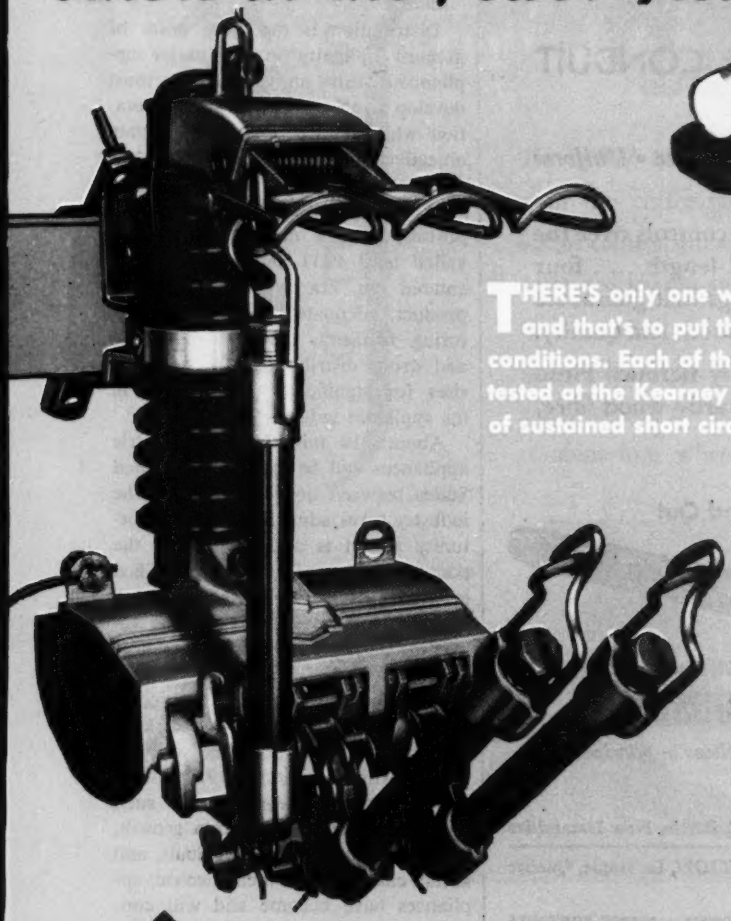
HAVE YOU added substation capacity recently? Chances are you have because load density is growing fast. Then ask yourself this question. Will present fuse cutouts on my distribution system interrupt the heavier fault current? If the nameplates say "KEARNEY" . . . then the answer is "YES."

Feeder outages in 5 years will be even more costly, more damaging than they are now. Kearney field-trained engineers know first hand how important it is to isolate faults; how much they can cost in time, money and customer ill will. That's why Kearney Fuse Cutouts have been designed to clear shorts far heavier than present NEMA standards require. And remember . . . this extra interrupting capacity costs you no more than ordinary cutouts designed for present loads only!

fuse CUTOUTS

others in the Power Field

TRIP O MATIC
Enclosed Type Cutout. Full Range Fault Protection For Urban Systems. Ratings: 5 and 7.5 KV; 50 and 100 Amperes.



TRIPSAVER . . . Three Shot Reclosing Type Cutout. Provides Service Continuity On Troublesome Circuits. Ratings: 7.5—34.5 KV; 100 and 200 Amperes.

THERE'S only one way to check up on field performance . . . and that's to put the cutout into service under exact operating conditions. Each of the 4 fuse cutouts illustrated has been thoroughly tested at the Kearney Sub-Station Laboratory, where 445,000 Kva of sustained short circuit energy are available line to line. Each has proved itself to have the extra interrupting capacity needed to clear increased fault currents.

Then, too, operating records from utilities the country over prove that Kearney cutouts give trouble-free performance in every type of climate, in every type of corrosive atmosphere. At least 15 years of on-the-line service stand behind each of these leaders in primary protection. Take advantage of this proved record.

Be ready for tomorrow . . .
Specify Kearney Today!

JAMES R. KEARNEY CORPORATION
4224-42 CLAYTON AVE. • SAINT LOUIS 10, MO.
Canadian Plant: Guelph, Ontario

-836

be sure of

UNIFORMITY. . . use

BERMICO® FIBRE CONDUIT

Uniform wall thickness • *Uniform* diameter of bore • *Uniform* impregnation • *Uniform* quality of fibre.

Automatic forming and processing . . . close controls over the drying process . . . machining of taper and length . . . four rigid factory inspections—these are the things that guarantee Bermico's uniformity of dimensions, specifications and quality.

For surest cable protection, be sure to specify Bermico Fibre Conduit. Made by Brown Company from sturdy wood fibre, impregnated with pitch, it is—

• Light • Tight • Strong • Smooth Inside and Out
• Acid-Resistant • Waterproof

distributed by
WESTINGHOUSE
Electric Supply Company. Offices in principal cities

BROWN QUALITY COMPANY, Berlin, New Hampshire
CORPORATION, La Tuque, Quebec

SOLKA & CELLATE PULPS • SOLKA-FLOC • NIBROC PAPERS • NIBROC TOWELS • NIBROC KOWTOWLS
NIBROC TOILET TISSUE • BERMICO SEWER PIPE, CONDUIT & CORES • ONCO INSOLES • CHEMICALS

(*Continued from page* 232)

lower product costs to the consumer. Electricity is still the cheapest item in the family budget. In 1951 the 1939 dollar would have purchased $1.42 worth of electricity contrasted with 54 cents worth of all goods and services making up the overall cost of living figure.

New England's long-range 30-year expansion program carries a $3 billion price tag. The co-operative regional advertising program is firmly established. All of us must kill any attempts by the Federal public power crusaders to socialize this vital American industry. Perhaps to insure an even greater future of serving the public at less cost and even greater efficiency we should be thinking and planning for a "United Electric Power Co of New England."

Greatest Difficulty: Distribution

CLARENCE H. LINDER, vice president and general manager, Major Appliance Division, General Electric Co before the Investment Analysts Society at Chicago, Illinois.

Distribution is the focal point of greatest difficulty in the major appliance industry and the industry must develop an effective distribution operation which will produce the volume objective at reasonable cost to the consumer.

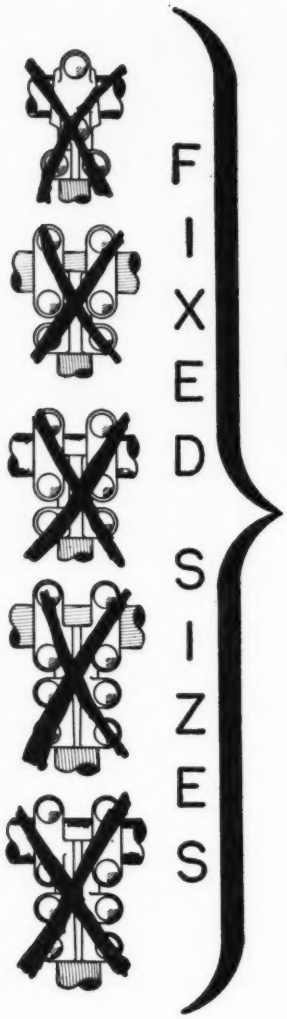
A buyer's market has replaced the postwar seller's market which prevailed until 1951 and we have now entered an era where a superior product, adequate low-cost manufacturing facilities, creative marketing, and strong distribution are the requisites for significant participation in the appliance industry.

About 110 million major electric appliances will be sold in the United States between now and 1960 if the industry takes advantage of its opportunity and it is anticipated that the country will have 50 million electrified homes by 1960. The number of major electric appliances in use then will average nearly 4 per home instead of the present 2.2.

Retail billings of major electric appliances are expected to total at least $5 billion annually by 1960 in comparison with $3 billion in 1951.

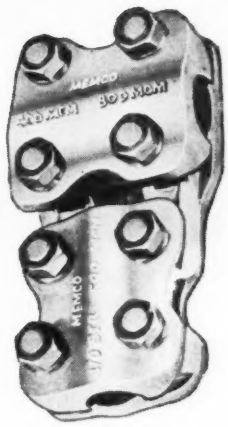
The increases are due to such factors as normal population growth, increased earnings by individuals, and social changes in which electric appliances have become and will continue to become more important.

SAVE COST AND MAN-HOURS

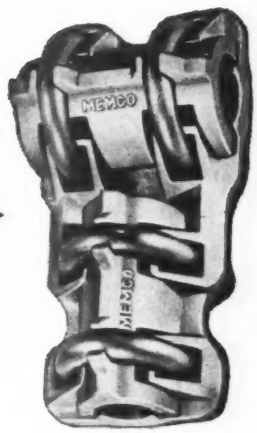


USE MEMCO *WIDE-RANGE* POWER CONNECTORS

STRAIGHT-BOLT → TYPE



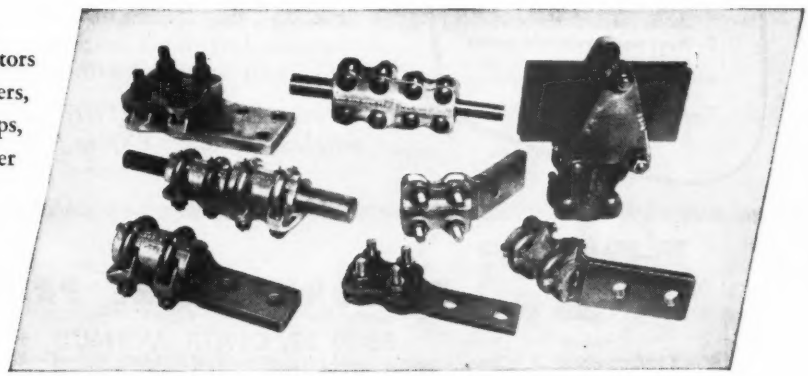
"U"-BOLT → TYPE



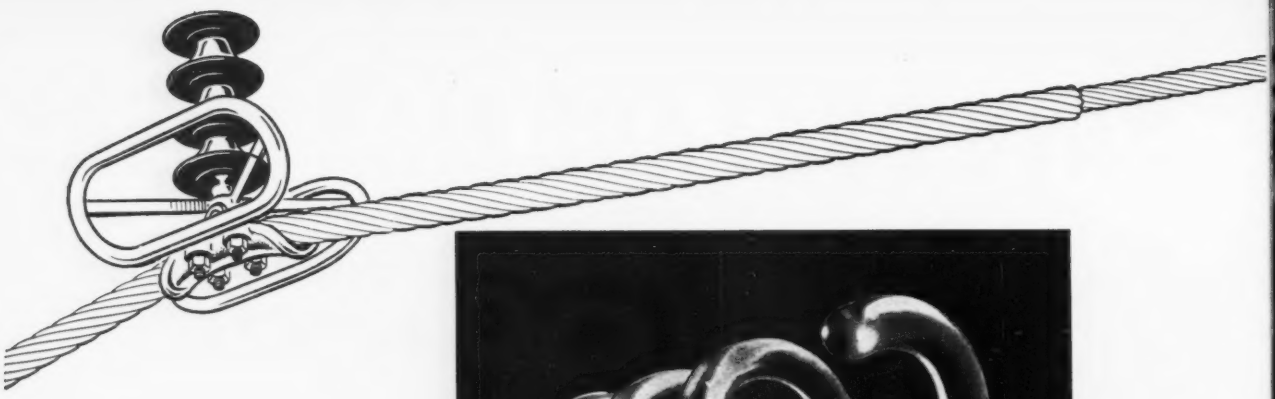
The NEW MEMCO wide-range electric power connectors span the entire range from #4 solid wire through 2000 MCM cable with only seven fittings. This saving in inventory costs, stockroom space and handling and engineering application constitutes a real advance. Either straight-bolt type or "U"-bolt type is offered to suit the buyer's choice. They are available for copper, aluminum or aluminum to copper combinations when so specified.

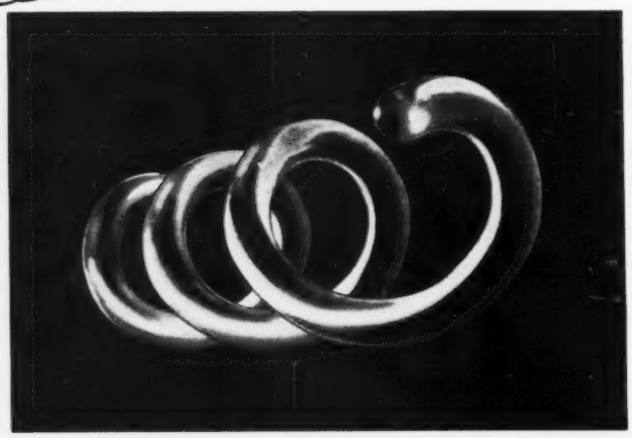
The MEMCO wide-range connectors are available in lugs, tees, couplers, stud connectors, bar tap-off clamps, etc. and can be used with either cable or tubing.

Write for Bulletin 521.



MEMCO ENGINEERING & MANUFACTURING CO., INC. • Commack, L.I., N.Y.





Preformed Armor Rods are UNIFORM

PREFORMED ARMOR RODS:

1—Are "factory-formed" to the individual conductor.
2—Reduce substantially installation time.
3—Increase the effective rigidity of the conductor.
4—Minimize fatigue at suspension clamps . . . lengthen conductor life.
5—Have predictable field service performance.
6—Increase conductance of conductor.
7—Are reusable.

• All Preformed Armor Rods for a given size of conductor are identical. Every pitch is exactly the same. THIS UNIFORMITY, obtained only by "factory-forming" the rods in precision dies with automatic machines, assures the UNIFORMITY of every Preformed Armor Rod assembly. Such inherent UNIFORMITY is maintained, not deformed, during installation or during operation.

PLP UNIFORMITY assures full efficiency of the armor regardless of the size of the conductor, ease of access to the application point, and the skill of the lineman installing it. With Preformed ARMOR rods, no special tools or wrenches are required. Easily installed by hand or hot-line tools, their field service performance can be predicted accurately.

Because the *gripping* action of Preformed Armor Rods is "built-in", they require no end-clamps; they are engineered to retain their initial intimate contact with the conductor throughout their service life . . . nothing to loosen.

For complete details of their exclusive advantages, write or telephone Cleveland: EXpress 1-3571.

PREFORMED LINE PRODUCTS COMPANY
5349 ST. CLAIR AVENUE • CLEVELAND 3, OHIO

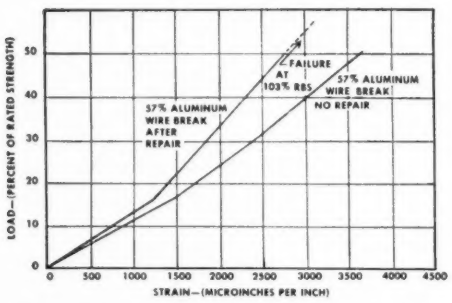
HOW Preformed Armor Rods LENGTHEN CONDUCTOR LIFE

★ The most vulnerable spot of a transmission line is under the suspension clamp. You can get no better armor protection than Preformed Armor Rods. They are always *uniform*—always do the same perfect job—factory engineered and factory formed—no variation in installation. Their intimate contact with the conductor provides the necessary reinforcement without any of the rub or chafe between rods and conductor, which you might expect in a looser installation. Furthermore, they will never loosen. They are not dependent on tightening of bolts which might crush the conductor if improperly applied—and which may become loose.

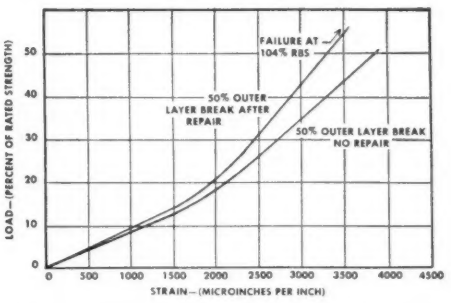
But this is only part of the story: While Preformed Armor Rods will provide the *best* and *safest* protection, they have another *unique* function—they do a job which only Preformed Rods can do. Regardless of armor efficiency, some vibration damage may occur. Should a strand failure occur at the suspension point, Preformed Rods will automatically take on the load, restoring strength and conductance—thereby continuing and lengthening conductor life.*

After all, your interest is in maintaining service—in continued functioning of your transmission lines. You need no longer consider the life of your conductor jeopardized by a strand failure. Preformed engineering has seen to this.

* Many have encountered vibration, chafing and burning failures on unarmored conductors and have used Preformed Armor for repairing and restoration of conductors at those points.



Strength restoration of No. 4, 7 x 1 ACSR (rated breaking strength—2288 lbs.) by Preformed Armor Rods.



Strength restoration of 795 MCM, 26x7 ACSR (rated breaking strength—31,200 lbs.) by Preformed Armor Rods.

These two charts tell the story. Irrespective of conductor size and construction, the clamping characteristics of PREFORMED Armor Rods result in restoration of the strength of damaged conductors to within at least 5 per cent of the rated breaking strength of the original conductors. And remember . . . only with PREFORMED Armor Rods . . . can laboratory tests accurately predict field service performance. There are no "average" installations.

SALES REPRESENTATIVES:

C. B. Anderson Co., *Tulsa* ● **Bergstrom-Verbarg Co.,** *Minneapolis* ● **Vincent J. Brown Co.,** *Buffalo* ● **Burns Electric Co.,** *Pittsburgh* ● **Earl S. Condon Co.,** *Los Angeles* ● **Cory and Crum,** *Indianapolis* ● **The Electrical Distributors Co.,** *Philadelphia* ● **Engineer Sales Co.,** *St. Petersburg* **JSG Electric Co.,** *Chicago* ● **E. L. Flowers,** *Boston* ● **George R. Horne & Co.,** *Dearborn* ● **Johnson Sales Co.,** *Bay City* ● **H. L. Macon & Co.,** *Atlanta,* **Peterson Co.,** *Denver* ● **Elgin B. Robertson, Inc.,** *Dallas* ● **Elgin B. Robertson Co.,** *Houston* ● **K. M. Ryals Co.,** *San Francisco* ● **Shaffer and Nelson,** *Portland, Seattle, Spokane* ● **M. H. Snyder & Sons,** *New York* ● **Curtis H. Stout,** *Little Rock, Memphis, New Orleans* ● **L. H. Wendegatz,** *Kansas City*

LETTERS TO THE EDITOR

Eager Beaver

To the Editor:

In the April 27 issue of Electrical World there is an error in one of your items under the Industrial Relations column. In the first item of "Labor Briefs" you state that the Fall River Electric Light Co made a labor settlement with the IBEW for a 6% wage increase. This statement is in error, as the employees of the Fall River Electric Light Co recently voted not to accept the company proposal regarding the 6% wage increase, and we are presently engaged in labor negotiations on this matter. I realize that because of the scope of your magazine such errors may occur. However, since many of our employees read Electrical World this statement might very well cause some consternation. Therefore I would appreciate it if you would print a correction in a later issue.

James Mullins
President

Local 1465 IBEW
Fall River, Mass.

• Apparently one of our correspondents reported as a fait accompli that which was only in process. We regret the error and will be glad to publish the true outcome of the negotiations when they are finished.

Canadian Statistics

To the Editor:

. . . The inclusion of a Canadian section in this Statistical Booklet is, in my opinion, much worthwhile and should be very valuable. The whole issue contains so much information in concise form, that it will take some reading and consideration before its value can be assessed readily.

Howard Fellows
Chief Engineer

Nova Scotia Power Commission
Halifax, N. S.

. . . The Canadian Section is a major and real improvement. It is nevertheless regrettable that more Canadian producers did not report to make your Canadian picture more representative. But this is no fault of yours. Now that you have a Canadian section, more Canadian producers should see the advantages of reporting and govern themselves accordingly.

K. L. Dawson
Statistical Officer

Nova Scotia Light & Power Co, Ltd
Halifax, N. S.

. . . The Canadian section is the section I appreciate, and I hope you will continue to publish same.

L. G. McNeice
Engineer

Orillia Water, Light & Power Commission
Orillia, Ontario

Request from India

To the Editor:

In the issue of the Electrical World dated December 29, 1952, there was a description of a booklet entitled "Electricity for Better Living." I shall be obliged if you could kindly send a copy of the booklet, if available with you, addressed to the undersigned. In case it is not available with you, it will be very kind of you if you could either write to the authority concerned to supply the same or intimate the address of the said authority.

Harbans Singh
Asst Sales Engineer
(for Chief Engineer P. Sharma)

Punjab, P.W.D. Electricity Branch
Simla, India

• How far that little candle . . .

Lend Not Spend

To the Editor:

Your March 30, 1953 News issue of Electrical World, page 15, contains an article titled "Decline in REA Loans Expected." In the first column, next to the last paragraph, I am sure there is an incorrect choice of words when referring to loans which it had scheduled to *spend* during the year.

This gives an entirely wrong impression and care should be exercised to refer to such funds consistently as being loaned. How did the word spend get into the text?

You realize that many people have the false impression that such loan funds are a direct and ill advised burden on the tax payer. Honest appraisal of the loan program of REA will reveal that it has proven a sound investment and resulted in considerable improvement to our entire economy. Many poles would still be standing in the woods, many refrigerators would not have been manufactured, except for the REA program. Others have benefitted, and in many ways, but the direct benefits of improved rural living largely due to REA loans is so great that figures of the number of farms electrified do not fully indicate the benefits to America.

I am inclined to believe someone has deliberately distorted the text by changing the term from *lend* to *spend;* however, it could be a typographical error. It is a false impression that is planted in the reader's mind and perhaps unnoticed by your policy making group.

One of our recent payments of over $9,000 to REA forcefully brought to my attention the fact that the money that was loaned to the Taylor County Electric Cooperative is being paid back with interest. Can you really call that spending on the part of REA? I am convinced it has proven to be one of the best investments the people have made. Those funds were not spent.

I would appreciate receiving your comments on this matter.

Charles W. Berglund, Jr
Manager

Taylor County Electric Cooperative
Medford, Wisc.

One-Shot Lockout

To the Editor:

In the February 2 issue of Electrical World you stated that "One-shot lockout is suggested as a way of protecting crews doing live wire work on circuits equipped with automatic recloser."

We hope that you are aware of the fact that our Kyle reclosers are available with such an attachment, and have been for quite some time.

An advertisement in the December 24, 1951 issue of Electrical World, describes its operation.

P. R. Gustkowski
Advertising Manager

Line Material Co
Milwaukee, Wisc.

LIGHTING THE WAY TO SAVINGS

...for Street and Factory Illumination

Sylvania Mercury Vapor Lamps offer more light . . . better light to see by . . . at lower cost.

Sylvania's line of improved mercury vapor lamps brings high lighting efficiency to municipal, commercial, and industrial installations . . . at remarkably low costs.

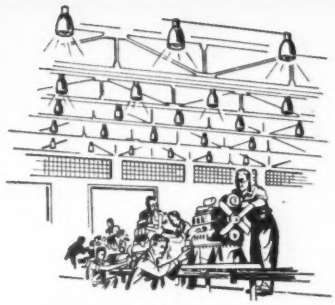
These modern lamps have an average rated life of 6,000 hours . . . many times longer than ordinary incandescent bulbs. They also offer twice the light output of incandescent types for the same amount of wattage.

As a result of this higher intensity, fewer lamps and fewer fixtures are required. This in turn means big savings in installation, maintenance and service costs, too. New illustrated folder gives complete information and characteristics concerning Sylvania Mercury Vapor Lamps. Mail the coupon for your copy NOW!

No. EH-1.
This Sylvania Mercury Vapor lamp is being successfully used today for both street lighting and industrial lighting. Rated at only 400 watts, it delivers 20,000 lumens.

For better, safer street illumination, alert municipal authorities are turning more and more to efficient, economical Sylvania Mercury Vapor Lamps.

For outdoor floodlighting, parking areas and sportslighting, Sylvania Mercury Vapor Lamps bring desired lighting intensities at desirable savings in costs.



For improved industrial lighting in high bay installations, Sylvania Mercury Vapor Lamps help to increase production and reduce lighting costs.

SYLVANIA

LIGHTING • RADIO • ELECTRONICS • TELEVISION

In Canada: Sylvania Electric (Canada) Ltd., University Tower Bldg., St. Catherine St., Montreal, P. Q.

Sylvania Electric Products Inc.
Dept. 3L-2705, 1740 Broadway
New York 19, N. Y.

Please send me new illustrated folder describing Sylvania Mercury Vapor Lamps.

Name_____

Street_____

City_____ Zone____ State_____

HARVEY H. PLANK

FRANK P. HYER

Harvey H. Plank Named VP. . .

. . . and general manager of Delaware P&L. Hyer is his successor as vice president in charge of engineering and operations.

Harvey H. Plank, vice president in charge of engineering and operations, for Delaware Power & Light Co, has been elected vice president and general manager of the company. Frank P. Hyer, supervisor of operations, has been named vice president in charge of engineering and operations.

Plank succeeds M. G. Kennedy who has retired after more than 50 years' service in the public utility field, the last 22 years being spent as the executive vice president of Delaware P&L. Kennedy will continue as a member of the board of directors.

Bear, Streed Elevated . . . Fred T. Bear, formerly chief engineer, has been appointed to the newly created position of manager of engineering and Evald R. Streed, formerly assistant chief engineer, has been advanced to chief engineer.

Delaware P&L has also announced the following appointments: J. W. Mackie, comptroller; H. J. Perkner, assistant comptroller; and H. M. Barrett, purchasing agent.

In his new position, Plank assumes responsibility for the supervision of all departments of the company and its Maryland and Virginia subsidiaries. Hyer's new post will place him in charge of engineering planning and operations of company's property.

Plank, a graduate of Clarkson College of Technology, went to Wilmington as assistant to the general manager in 1943, later assuming the vice presidency. Before going to Wilmington, he was associated for many years with United Gas Co, Philadelphia, having spent his entire business life in public utility work.

After graduating from the University of Wisconsin, Hyer entered public utility work. He has devoted practically all of his business career to this field, including several years as a member of the Wisconsin Public Service Commission. Just prior to coming to Wilmington he was associated with the General Public Utilities Corp, New York, as an operations and engineering consultant.

Westinghouse Appoints 5 New Vice Presidents

Westinghouse Electric Corp has elected five new vice presidents. They are:

Bruce D. Henderson, general manager, purchases and traffic, was elected vice president in charge of purchases and traffic. He succeeds Andrew H. Phelps, who is retiring.

William C. Rowland, manager, Manufacturing and Repair Division, was promoted to vice president in charge of that division.

Franklin L. Snyder, manager, Aviation Gas Turbine Division, was made a vice president on the staff of the executive vice president of the Defense Products Division. Leslie E. Lynde, vice president, Washington office, succeeds Snyder as manager.

C. Swan Weber, Eastern district manager, becomes vice president in charge of the Washington office. Robin S. Kersh, executive vice president of Westinghouse Electric International Co, was named vice president of the parent company in charge of the Eastern district.

•

Frank J. Schmitt has been appointed director of street lighting for Rochester Gas & Electric Corp. Schmitt, who joined the utility in 1918, has been serving as supervisor of street lighting since 1945.

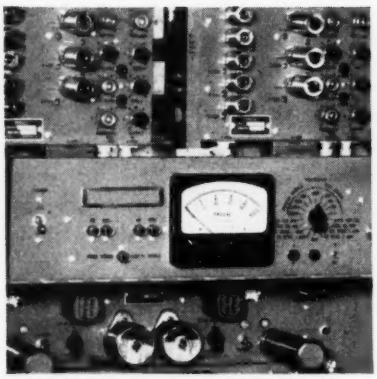
William H. Eichhorn, Jr, has been elected treasurer of Pennsylvania Water & Power Co. **Jesse Marden IV,** assistant secretary, was made secretary to replace Eichhorn.

Walter Heren Named President of PUAA

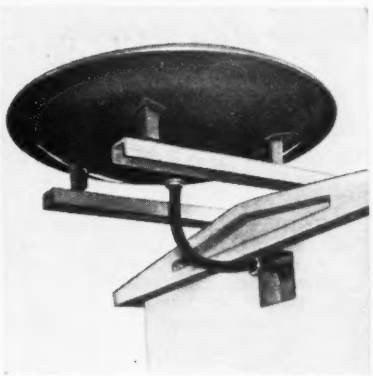
Walter G. Heren, director of advertising and public relations for Union Electric Co of Missouri, has been elected president of Public Utilities Advertising Association. Heren, formerly first vice president of PUAA.

WALTER G. HEREN

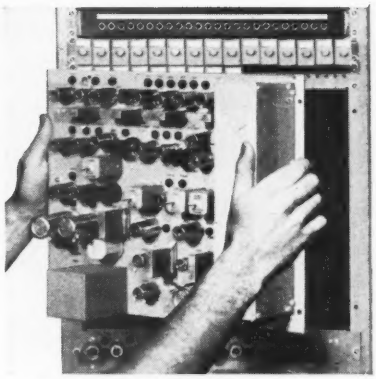
PHILCO MICROWAVE CUTS COMMUNICATIONS COST



TEST JACKS AND BUILT-IN METERING
Field circuit analysis simplified by built-in metering and test points on every major circuit for instantaneous monitoring of any current or voltage.



ANTENNA-REFLECTOR SYSTEM
Tower climbing eliminated for routine checks since antennas are mounted at ground level, easily accessible for maintenance.

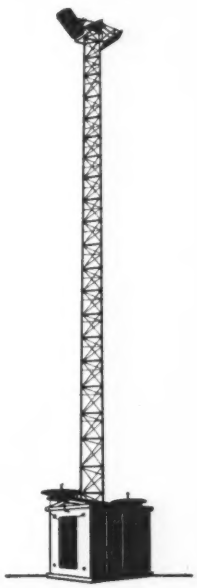


"PACKAGED UNIT" COMPONENTS
Field maintenance time and cost saved. All assemblies removable with only the use of a screwdriver for quick field replacement and depot checkout.

Reduce your communications cost with Philco microwave. Thousands of your communications dollars will be saved by the cost cutting features built into each Philco unit. Philco engineers know there is no substitute for quality and low maintenance cost.

That is why Philco microwave is built to Joint Army-Navy Specifications and why Philco's exclusive design slashes field maintenance time with built-in metering and test points on all major circuits . . . eliminates tower-climbing for routine checks with passive reflector-antenna system . . . allows quick field replacement of major assemblies with Philco's exclusive "packaged unit" components, removable with only a screwdriver.

Look to Philco microwave to cut your communications cost.



For full information write to Department EW

PHILCO CORPORATION

GOVERNMENT & INDUSTRIAL DIVISION

PHILADELPHIA 44, PA.

GET GROUND LEVEL EFFICIENCY

*40 feet High with the Industrial Monkey

...the foot-controlled telescoping boom that takes the man straight to the job with BOTH HANDS FREE FOR WORK

Enable your men to work at ground level efficiency when the job is forty feet high! They'll get *more* work done, safer, faster and at *less* cost with an Industrial Monkey. You'll save man-hours, time and operating costs on *all* high work jobs. The Industrial Monkey pays for itself in savings alone in a surprisingly short time!

The Monkey — a hydraulically-operated telescoping boom with an insulated (24,000 volts) self-leveling cage — has been *job-tested* and *experience-proved* to become standard equipment with many utility companies.

The Monkey operates from horizontal to vertical with a 270° arc and is foot controlled with dual controls in the truck cab. *The operator has both hands free for work!* Cut the high cost of high work with Industrial Monkeys!

***40 feet, ground-to-floor of platform**

PLUS the man's height

PLUS his reach

Call, write or wire* TODAY *for complete details.

THE DONWILL COMPANY

835 S. E. MAIN STREET, PORTLAND 14, OREGON

MOBILIFT CORPORATION • 2317 W. 18th, CHICAGO

790 PATTERSON AVE., E. RUTHERFORD, N. J. • 2724 TAYLOR ST., DALLAS

1113 SPRING ST. N. W., ATLANTA • 2730 SAN PABLO AVE., BERKELEY

succeeds Paul L. Penfield, supervisor of advertising for Detroit Edison Co. (See PUAA convention story p 135.)

Besides Heren, other officers elected at the PUAA convention include the following:

First Vice President, C. Fred Westin, Public Service Electric & Gas Co, Newark, N. J.; second vice president, Raymond W. Fenton, Peoples Gas Light & Coke Co, Chicago; third vice president, Robert H. Bridges, Cleveland Electric Illuminating Co; secretary, George G. Hanel, Connecticut Light & Power Co, Hartford (re-elected); and treasurer, Mead Schenck, Interstate Power Co, Dubuque, Iowa (re-elected).

Heren went in 1940 to St. Louis to do public relations work with Union Electric. After serving as advertising manager, he was made director of advertising and public relations in 1950. Prior to joining Union Electric he was engaged for 18 years in newspaper and advertising work in Kansas City.

LESTER E. REYNOLDS

Lester Reynolds Named VP of Connecticut L&P

Lester E. Reynolds has been appointed vice president and treasurer of Connecticut Light & Power Co to succeed Paul R. Fleming, who will retire June 1.

John M. Kramarsik, who has held various executive posts in the utility's accounting department, has been made executive assistant reporting to the president. He has served as assistant secretary and treasurer.

Reynolds, who joined the company in 1921, has served Connecticut L&P as auditor and assistant treasurer, and

which starts 30,000,000 cars . . . or more

is the falling flakes of mica from the hoppers of our tremendous "snowing" tables — where mica starts to get its plus value — the Macallen qualities which in electrical systems do start millions of cars, planes and battleships every day of the week.

Dependable beyond question. WHERE YOUR INSULATING NEEDS CALL FOR MICA — AVOID TROUBLE — SPECIFY MACALLEN MICA.

when you think of MICA . . . think of MACALLEN

THE MACALLEN COMPANY

16 MACALLEN STREET • BOSTON 27, MASS.

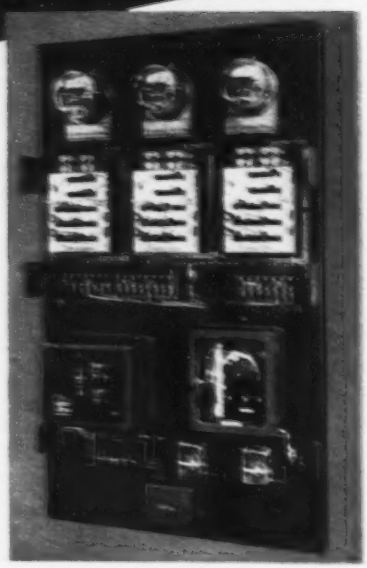
MACALLEN MICA

ALL FORMS, ALL QUANTITIES — ALL DEPENDABLE

CHICAGO: 565 W. WASHINGTON BLVD. CLEVELAND: 1231 SUPERIOR AVE.

TESCO

TRANSFORMER-LOSS COMPENSATOR SAVES YOU MONEY



BECAUSE it provides an accurate means of measuring the energy and demands of high-voltage services at the low-voltage side of the transformers.

The TESCO compensator is simply this: it adds to the registration of the watthour meter an amount equal to the sum of the iron and copper losses of the transformer bank. It may be used with practically any type of watthour meter and . . . *importantly* . . . no changes are made in the meter itself, either structurally or in adjustments! It retains its integrity as a standard measuring unit.

TESCO developed the compensator for use on customers' installations where the contract provides for supplying and billing energy and demand at distribution or transmission voltages.

The compensator is produced with two- and three-element types for use with two-element or three-element meters on any type circuit.

TESCO transformer-loss compensators on a two-element 6.6 KV 18,750 KVA metering installation with three transformer banks.

FREE . . .

Detailed, informative booklet . . . yours for the asking. It explains fully the operation, installation, varied applications of TESCO Transformer-Loss Compensators. Write us today for your copy.

Companies Now Using TESCO
TRANSFORMER-LOSS COMPENSATORS

Philadelphia Electric Company
Public Service Company of New Hampshire
Idaho Power Company
Pennsylvania Power & Light Company
Eastern Shore Public Service Company of Maryland
New York State Electric & Gas Company
Westinghouse Electric Corporation
General Electric Company
Texas Power & Light Company
U. S. Bureau of Reclamation
Indiana & Michigan Electric Company
Atlantic City Electric Company
Utah Power & Light Company
Connecticut River Power Company
Monsanto Chemical Corporation
Louisiana Power & Light Company
Riviera Utilities
Southern California Edison Company
Northern States Power Company
Cambridge Electric Light Company
New England Power Corporation

EASTERN SPECIALTY COMPANY
PHILADELPHIA 40, PENNA.

in 1947 was made comptroller. Fleming, who entered Connecticut L&P service in 1930 as assistant secretary, served successively as secretary, secretary and treasurer, and vice president. In 1951 he was named vice president and treasurer.

HARLAN P. BOSWORTH, JR

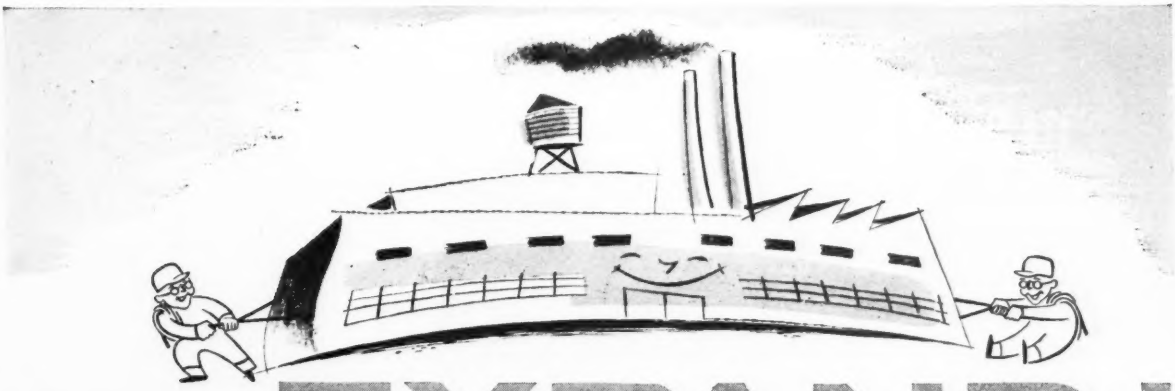
California Oregon Power Appoints Bosworth a VP

Harlan P. Bosworth, Jr. has been elected a vice president of California Oregon Power Co. He will continue to work as assistant to John C. Boyle, vice president and general manager.

A graduate of Cornell University, Bosworth joined Copco in 1923 to work on field surveys for proposed power developments and on design of hydraulic features of the projects. From late 1925 to 1929 he worked in the office of the vice president and general manager in Medford, Ore., and in September, 1929, was appointed manager of the Klamath Falls District. He held that position, with the exception of three and a half years in the Army Corps of Engineers during World War II, until 1947 when he was transferred back to the Medford office as assistant to the vice president and general manager.

Richard Green Appointed Executive Vice President

Richard C. Green has been elected executive vice president of Missouri Public Service Co. Green, who has been acting executive vice president for the last two years, now officially



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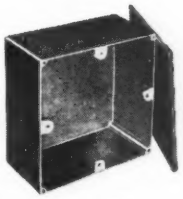
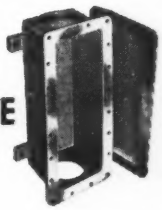
And now we have not one or two

but three times the capacity

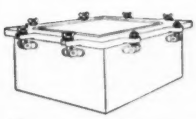
to meet the demand for

cast iron boxes like our types YS  and YE 

Everybody wants them

for **O.Z.** boxes are quality controlled

from drawing board

to completed box 

Of course, increased production

means revised PRICES

Write for your new price list today!

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O.Z. ELECTRICAL MANUFACTURING COMPANY, INC.

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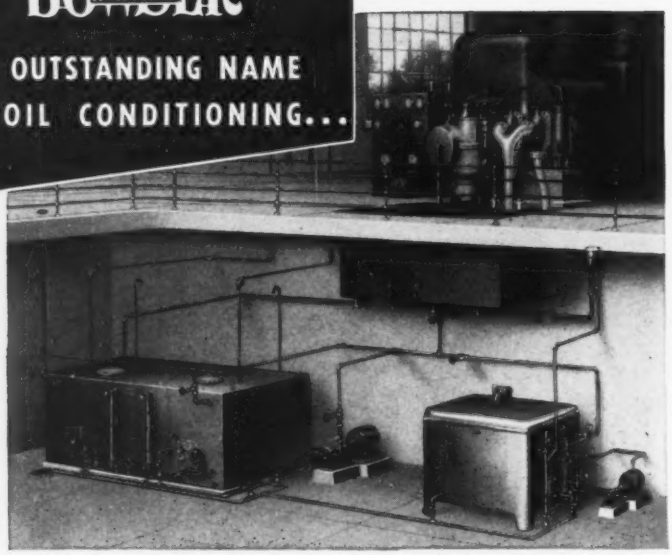
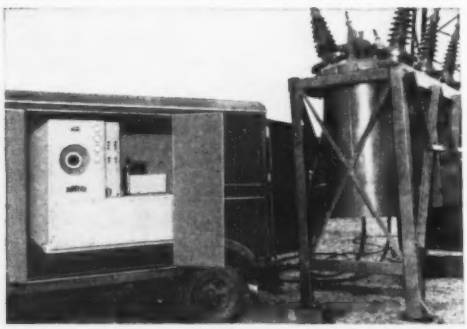
CONDUIT FITTINGS • CABLE TERMINATORS • CAST IRON BOXES
SOLDERLESS CONNECTORS • GROUNDING DEVICES • POWER CONNECTORS

BOWSER
ESTABLISHED 1885
THE OUTSTANDING NAME
IN OIL CONDITIONING...



...for power generating equipment!

This Bowser turbine oil conditioning system keeps oil "bone dry" and crystal-clear . . . the best "stay-on-the-job" insurance a turbine bearing can have. Costly bearing failures are avoided and less stand-by equipment is required with Bowser oil conditioners. Turbine oil lasts for years, too! That's why Bowser oil conditioners are on the job in a majority of power plants.



...for insulating oils!

The Bowser Hydro-Volifier is a conditioning unit for transformer, circuit breaker and switch oils. It restores oil dielectric to 35 k.v. in a single pass while the equipment remains energized . . . no service interruptions with Bowser oil conditioning!

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RICHARD C. GREEN

takes over the duties of his brother, Aris L. Green, who has retired because of ill health. The Greens are sons of Ralph J. Green, head of Missouri PS.

Richard Green, with the company since 1941, was named vice president in December, 1950, and vice president and assistant general manager in December, 1951. Aris Green has been executive vice president since 1947. He will continue to be associated with the company as a member of the board of directors.

JOHN F. CHILDS

Heads Utility Department

John F. Childs has been elected vice president and named head of the public utility department of Irving Trust Co, New York. He succeeds Tom P. Walker, who was recently elected president and a director of Transcontinental Gas Pipeline Corp. Childs, who came to Irving in 1940, was made an assistant vice president in 1949.

we're adding

a Million

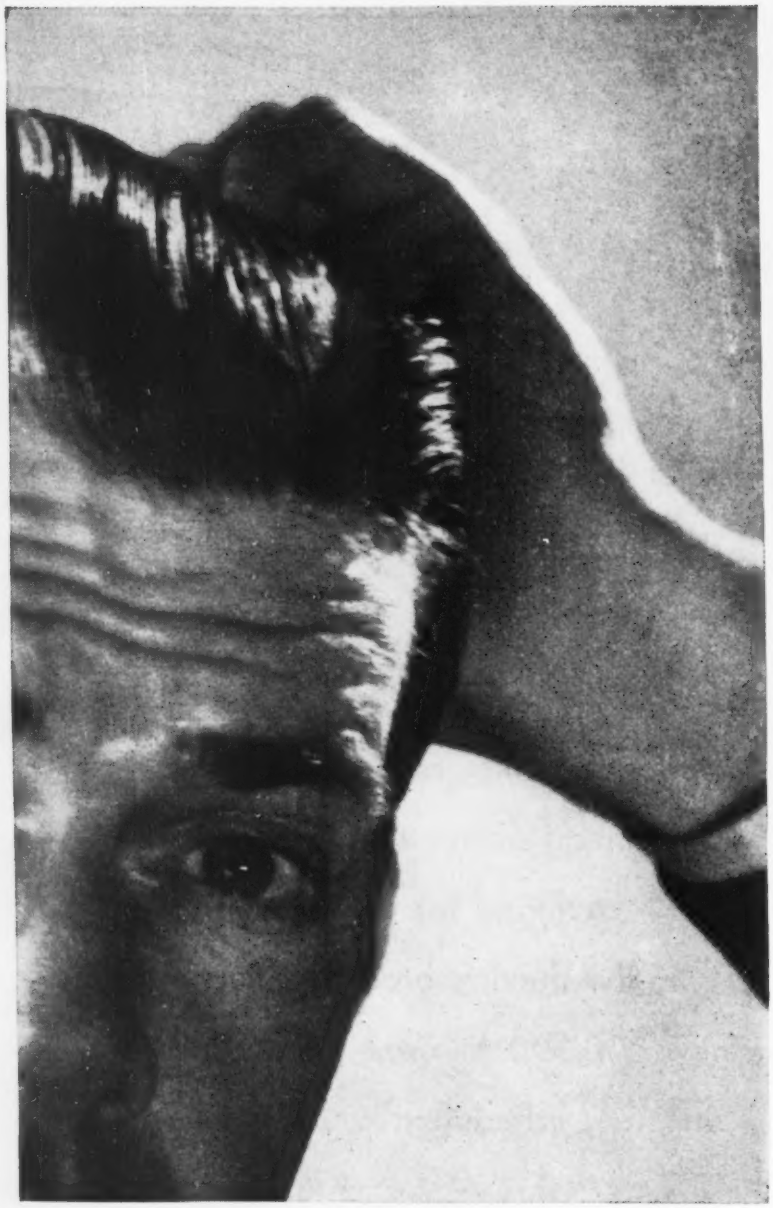
kilowatts . . .

AGE System companies continue to keep well ahead of the ever-increasing demand for electric power in the thriving area they serve. Five new 200,000-kilowatt generating units are scheduled for operation this year and early '54.

AGE American Gas and Electric Co.

and its Operating Affiliates

Appalachian Electric Power Company
Central Ohio Light & Power Company
Indiana & Michigan Electric Company
Kingsport Utilities, Incorporated
The Ohio Power Company
Wheeling Electric Company
Kentucky and West Virginia Power Company, Inc.



Don't scratch for the solution—

"AMPROBE" IT!

Is that motor overloaded? Does the system need rewiring? Snap the Amprobe around one conductor (insulated or uninsulated) and you have your answer in seconds. It's the only pocket-size snap-around volt-ammeter, for measuring current instantly without shut-downs or ammeter connections. Write for Catalog. Dpt. EW-53, Pyramid Instrument Corp., Lynbrook, N. Y. (Export Div.: 458 Broadway, N. Y. 13).

Amprobe "600" 0-15/30/60/150/300/600 amps A-C, 0-150/300/600 volts A-C. Complete with cowhide case and voltage test leads, $59.50. Amprobe "1200" (to 1200 amps A-C) $67.50 complete. Amprobe "300" (to 300 amps A-C) $49.50 complete.

JOHN W. ANNE

Elected a Vice President

John W. Anne has been named a vice president of Elliott Co, Jeannette, Pa. Anne, with the company since 1925, has been sales manager of the Jeannette Division since 1948. Before this he was manager of the heat transfer and turbine sales departments.

•

Eldred H. Scott, assistant comptroller of Detroit Edison Co, has been advanced to comptroller. **Arthur E. Bush** assumes the post of assistant comptroller after serving as statistician. **Russell G. Vernon,** assistant secretary in charge of the New York City office, has been appointed assistant treasurer.

J. F. Wilkes has been appointed director of research and product development for Dearborn Chemical Co, Chicago. Wilkes, with Dearborn since 1939, will be responsible for the operation and administration of the company's laboratory.

OBITUARY

Samuel C. Moore

Samuel C. Moore, 80, a founder of New England Electric System and board chairman of Narragansett Electric Co, died at Providence, R. I., May 8.

Moore, who was born in Ireland and came to the United States at the age of 17, started his utility career with the Consolidated Gas Co. He left that company to represent a group of New York bankers in the organization of the Colorado Power Co.

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Our long experience in working with both utilities and the public is your assurance of dependable work and good customer relations.

Bartlett branches stem from research

Bartlett branch offices are conveniently located and staffed by competent, highly-skilled diagnosticians and dendricians. They can be relied on to handle your shade tree problems skillfully and to your satisfaction.

But in employing Bartlett to handle your tree problems . . . you get a big plus. When you consult with Bartlett, you get the benefit of the combined scientific knowledge and long practice of a group including some of the nation's leading authorities in tree health and protection. Scientists are continually searching for new and better ways to protect the shade trees of America at the Bartlett Tree Research Laboratories in Stamford, Connecticut. So, any decision your Bartlett Representative makes is not based on his own individual judgment . . . it's based on years of experience of the whole Bartlett organization.

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No wonder those who are critical of results are turning more and more to the Bartlett Way. You, too, can benefit by Bartlett services. Call the nearest Bartlett office for a study of your tree condition.

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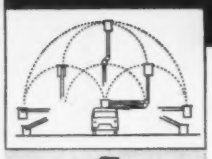
. . . it's the ELBOW
that makes the arm
flexible
efficient
versatile



HYDRO
SKY WORKER
(Formerly SKY LIFT)

. . . watch this giant arm flex at the elbow and effortlessly maneuver into the best position for a man to work aloft. There's no lost motion. Controlled from the crows nest, the hydraulically operated, articulated boom can be spotted to any location within its radius — forward, sidewards, backward, high or low.

Because SKY WORKER enables a man to approach a job from the *safest working angle,* on a *dependable, stable platform,* and in the *shortest possible time,* there is less fatigue, less hazard and tremendously increased man hour production.

Compare
These Features:

- Double crows nest carries two men and equipment in any position.
- Completely insulated outer boom.
- Insulated molded Fiberglas crows nest, automatically level.
- Compact design allows maximum body space utilization.
- 42 ft. working height.
- 31 ft. working radius.
- 360° rotation.

One of our units can be scheduled for a demonstration on your job. Write for complete information.

We specialize in engineering your particular job requirements.

TEY MANUFACTURING CO.
MILFORD, CONN.

After ten years in Colorado, Moore returned to the East and became affiliated with the New England Electric System. He was named president of the New England Power Co in 1929 and three years later went to Rhode Island to head Narragansett Electric. He retired as president of Narragansett Electric in 1948 and became chairman of the board.

Edward W. Conroy, 58, superintendent of transmission lines for Puget Sound Power & Light Co, died May 1 after collapsing at work. Conroy, an electrical engineer, joined Puget Power in 1922 as a distribution engineer.

Philip Peeples, manager of Georgia Power Co's Lighting Division since 1931, died May 4 at Bluffton, S. C. He had served as street lighting specialist for the utility from 1927 to 1931.

Carl E. Dreher, 49, assistant to the president of Westinghouse Electric International Co, died May 6 at Montclair, N. J. Dreher, an electrical engineer, joined Westinghouse in 1925 and transferred to the international company in 1928. He was appointed sales manager of the international company in 1948.

Hathorne H. Hussey, 55, for 33 years an electrical engineer with Central Maine Power Co, died April 30.

Andrew J. McCarty, 56, electrical sales manager for Public Service Co of Northern Illinois, died April 29 at Elgin, Ill.

LeRoy Warren Goodin, 65, retired operator of Idaho Power Co's Barber Plant, died April 20.

V. C. Bruce Wetmore, 76, retired New England district manager of Westinghouse Electric Supply Co's Wetmore-Savage Division, Boston, died recently at Boston. He founded Wetmore-Savage, an electrical supply firm which was absorbed by Westinghouse Electric Supply. He retired from the manager's post ten years ago.

Aaron E. Klingensmith, 82, who retired as superintendent of the Perry Power Plant of Indianapolis Power & Light Co in 1941, died in Indianapolis April 28. He joined the utility in 1919.

Testing is Forecasting

. . . providing FACTS (with proof) for management, engineering, and production men wisely to

- FORE-KNOW
- FORE-FIGURE
- FORE-ACT

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provides its clients with UNBIASED information to preclude depressions in product performance.

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Here's why most control center buyers specify Westinghouse

Why this mass preference? It all boils down to matching product to need. Close co-operation with industry, exhaustive tests and constant improvement have produced this control center which matches industry's every need. Here are the product features that make Westinghouse Control Centers the MOST PREFERRED control centers:

FLEXIBILITY

Westinghouse Control Centers have complete flexibility to match the periodic movement, substitution and addition of machines—flexibility of electrical components—flexibility of structural units. All cubicle units are built to a standard 14″ module—are completely interchangeable. Vertical structures are standardized and free-standing—can be moved or added at any time.

EASIER SERVICING

There is no maze of mechanical obstacles on a Westinghouse Control Center. A few twists of a screw driver and your serviceman is ready to go to work. Guide rails simplify removal and insertion of cubicles. All starter units are front wired. Side baffles are removable for easier wiring. Sectional and master terminal boards speed hook-up work.

POSITIVE SAFETY

Westinghouse Control Centers protect *both* personnel and equipment. The Westinghouse "Magnagrip®" stab connectors and tilt-out disconnect position assure a "dead" unit for servicing. Unit door remains on structure to cover hot buses when starter unit is removed. Tested baffling prevents explosive chain reactions if faults occur. Each starter has an interrupting capacity of not less than 15,000 rms amps.

Complete details on these and other important features are contained in the Control Center Booklet B-4213. Ask for your free copy. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-27021-A

YOU CAN BE SURE...IF IT'S

Westinghouse

Largest Turbogenerator . . .

. . . in the world to be built by GE for Detroit Edison's River Rouge Station. Machine is slated for delivery in 1955

General Electric Co has received an order from Detroit Edison to build a steam turbine-generator unit which will be the largest in the world.

Slated to be installed in Detroit Edison's River Rouge Station, the new unit will have a turbine rated at 260,000 kw. Its generator, rated 353,262 kva, is designed for conventional hydrogen cooling. The new turbine-generator is scheduled for shipment in the summer of 1955.

Reheat Type Unit . . . The machine will be the cross-compound, double-flow, reheat design developed by General Electric since World War II. In this type of machine, steam first enters the high pressure turbine at a pressure of 2,000 lb psi and a temperature of 1,050 F. Steam is exhausted from the high-pressure turbine at about 720 F and is returned to the boiler where it is reheated to 1,000 F before re-entering the turbine.

[Editor's Note: *At press time it was reported that Westinghouse Electric Corp has received an order for a similar machine from Detroit Edison.*]

Sylvania's 1st Quarter Net, Sales Set Records

Sylvania Electric Products, Inc, has reported that its net income and net sales for the first quarter of 1953 were higher than those of any previous quarter of the company's 52-year history.

Net income for the first quarter amounted to $3,679,243, an increase of 88% over the $1,953,771 reported for the same period of 1952. Net income was equal to $1.38 per share of common stock on 2,425,438 shares outstanding against 87¢ a share on 1,867,625 shares for 1952.

Net sales totaled $80,060,308, an increase of 43% over the $55,987,461 listed for the first quarter of 1952.

German Electrical Goods Exports Worry British

LONDON—(McGraw-Hill World News)—In its annual report for 1952 the British Electrical & Allied Manufacturers' Association Inc., has noted the intensifying competition in export markets for electrical goods and equipment from both Western and Eastern Germany.

Although official East German electrical export figures are not available, certain indications are reported that the state owned combines, by extensive advertising campaigns and exhibitions, are trying hard to gain a foothold in traditional U. K. markets.

W. German Exports up 59% . . . Meanwhile, Western Germany's electrical exports advanced from $157,640,000 (£56.3-million) in 1951 to $249,200,000 (£89-million) in 1952, an increase of 59%.

The main reasons for Germany's export successes, the report states, appear to be that she is able to offer shorter deliveries and more favorable terms of payment.

It is reported that the value of Japanese electrical exports during 1952 amounted to $24,080,000 (£8.6-million), against $15,120,000 (£5.4-million) during 1951.

Though strenuous efforts were made by Japanese exporters to gain new ground, reports of orders lost to Japan, mainly due to shorter delivery periods, fell off during the year, the report continues, and "competition from Japan is more to be feared in the future than at present."

British Exports Rise 15% . . . British exports of electrical goods reached a total of $610,400,000 (£218-million) last year, an increase of 15% on the 1951 total.

Much of this increase, says the report, was due to an improvement of $29,400,000 (£10.5-million) in electrical machinery exports, and to the expansion of $23,800,000 (£8.5-million) in shipments of electrical wires and cables.

"The electrical manufacturing industry," the report goes on to say, "resumes its place as the second largest exporting industry in the country. In the three years since 1950 it has increased its exports by one-third, an increase greater than that of any other major exporting industry.

"If the indirect exports of the industry, that is, electrical equipment supplied to other industries and incorporated in their exports are taken into account, the significance of the electrical industry in the British national economy is beyond question."

Concerned About Power Curbs . . . The report, however, expresses concern at the restrictions imposed on the power program of the British Electricity Authority—(EW—Jan. 19, 1953, p 15). It emphasizes that, as an inescapable necessity for economic recovery, the BEA plant program should progress year by year from the present 1,540 Mw a year to some 2,000 Mw.

Other factors which retarded home

MANUFACTURERS' EARNINGS

Company	Period Months Ended		Net Income 1953	Net Income 1952	Earnings Per Common Share 1953	Earnings Per Common Share 1952
Anaconda Wire & Cable	3	Mar.	$1,921,922	$1,607,273	$2.28	$1.90
Clark Equipment	3	Mar.	1,427,917	1,674,527	1.42	1.67(a)
Corning Glass Works	Per Jan. 1-Mar. 29		3,398,535	3,358,264	1.25	.86
E. I. duPont de Nemours	3	Mar.	56,721,002	50,812,906	1.19(b)	1.06(b)
Link-Belt	3	Mar.	1,870,257	2,101,277	1.12(c)	1.26(c)
Midwest Piping	12	Feb.	2,259,500	1,590,224	2.92(e)	2.06(e)
Minnesota Mining & Mfg	3	Mar.	4,256,859	3,740,188	.53(f)	.47(f)
Motorola	3	Mar.	3,174,208	2,238,135	1.64	1.16
National Vulcanized Fibre	3	Mar.	54,208,500	247,520	.39	.46
Phelps Dodge	3	Mar.	9,716,905	9,286,609	.96	.92
Radio Corp of America	3	Mar.	9,293,141	7,076,520	.61	.45
Revere Copper & Brass	3	Mar.	2,163,079	1,728,986	1.68	1.34
Sangamo Electric	3	Mar.	503,773	391,479	.72	.56
U. S. Rubber	3	Mar.	7,156,608	6,247,733	1.10	.94
Weston Electrical Instrument	13 wks.	Apr. 3	255,989	304,222	.80	.95(e)

Notes—(a) Based on shares now outstanding; (b) Based on average number of shares outstanding during period; (c) On shares outstanding at close of period; (e) Based on shares now outstanding; (f) On shares outstanding at close of respective periods.

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KNOX high voltage insulators

No. 81022

KNOX HI-LINE HARDWARE

No. 6206A-U
SUSPENSION CLAMP

No. 7206
SUSPENSION CLAMP

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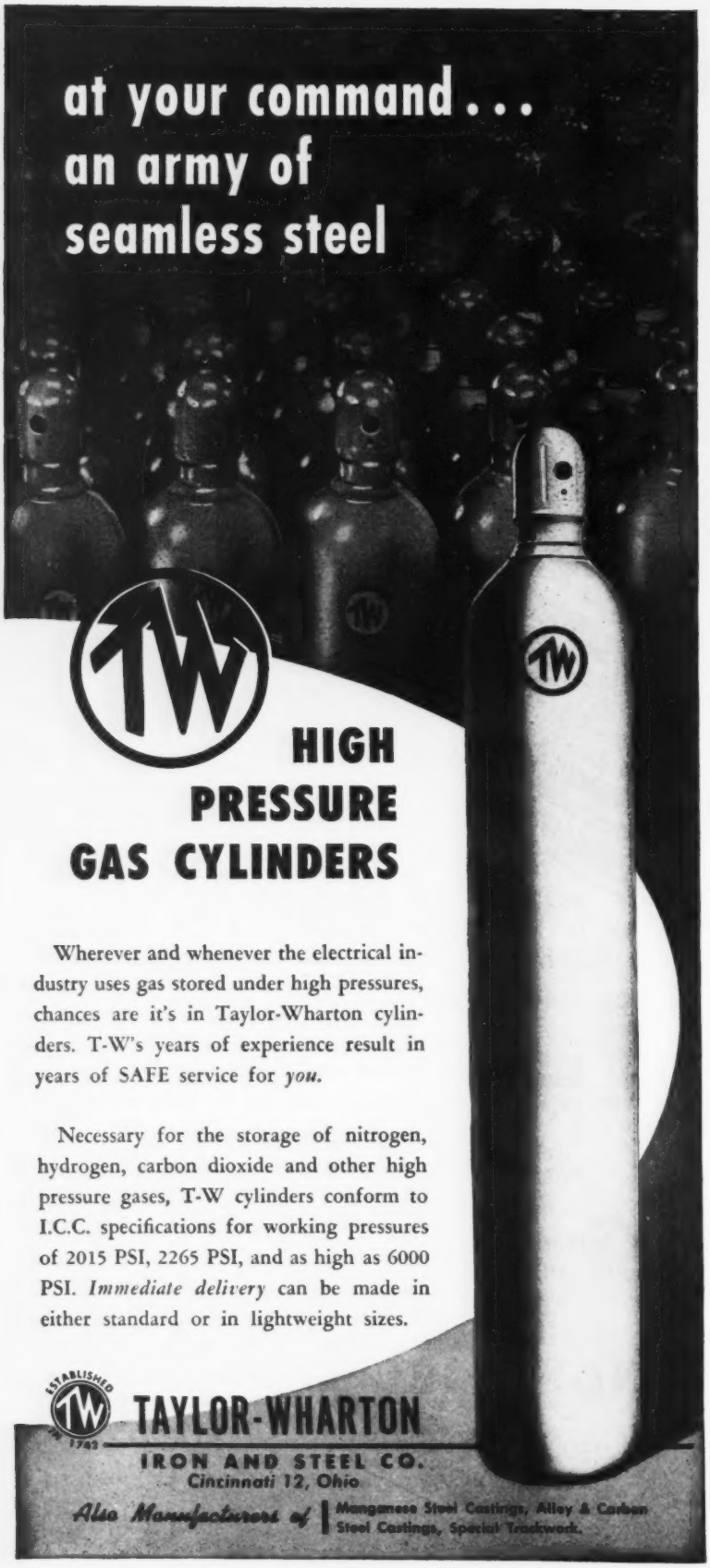
STRAIN CLAMP

Build your next high voltage line with KNOX Insulators . . . you'll find they are rugged and dependable . . . made to last longer. Companies installing KNOX Insulators and Hi Line Hardware agree they get superior service and performance regardless of weather conditions. KNOX Insulators are quality made and rigidly inspected to meet laboratory tests and specifications. Our ample stocks insure PROMPT delivery.

KNOX PORCELAIN CORP.

KNOXVILLE 1, TENNESSEE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an army of
seamless steel
HIGH
PRESSURE
GAS CYLINDERS
Wherever and whenever the electrical industry uses gas stored under high pressures, chances are it's in Taylor-Wharton cylinders. T-W's years of experience result in years of SAFE service for *you.*
Necessary for the storage of nitrogen, hydrogen, carbon dioxide and other high pressure gases, T-W cylinders conform to I.C.C. specifications for working pressures of 2015 PSI, 2265 PSI, and as high as 6000 PSI. *Immediate delivery* can be made in either standard or in lightweight sizes.
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TAYLOR-WHARTON
IRON AND STEEL CO.
Cincinnati 12, Ohio
Also Manufacturers of
Manganese Steel Castings, Alloy & Carbon Steel Castings, Special Trackwork.

sales of electrical appliances last year are given as the high rates of purchase tax, restrictions on hire purchase, and "anti-electricity" propaganda, which placed undue emphasis on the few power cuts which BEA has had to make during a long and severe winter.

British Again Submit Lower Bids for N W Units

A British firm again is low bidder for a large electrical equipment contract in the Pacific Northwest.

Ferranti Electric, Inc, with United States' offices in New York, submitted a low figure of $857,600 to the Army Corps of Engineers at Walla Walla, Wash., for furnishing six 56,500-kva main-unit transformers for McNary Dam. Another British firm, the English Electric Export & Trading Co, Ltd, was second at $898,081, with the Moloney Electric Co of St. Louis, Mo., low among U. S. firms at $983,228.

The contract calls for delivery of the first three units by Nov. 15, 1955.

A British firm recently bid low for equipment to be installed in Chief Joseph Dam, but all proposals were rejected and new invitations issued. The Corps of Engineers will open new bids June 1 at Seattle for four Chief Joseph generators, for which the English Electric Export & Trading Co figured low Dec. 3 at $4,406,493. Bids will be opened May 27 for ten main transformers, for which the English firm previously bid low at $1,831,880.

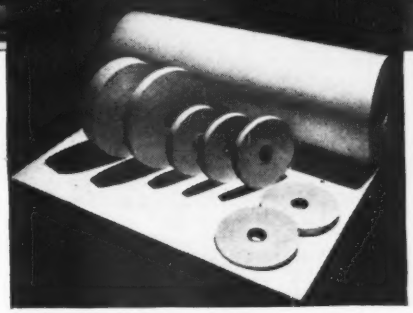
There are "slight technical changes" in the specifications for the new invitation, the Seattle office said.

GE Announces Price Changes on Some Units

A price increase of about 8% on distribution transformers, network transformers, light duty load centers, and transformers for load center unit substations has been announced by General Electric Co's Distribution Transformer Department.

Concurrently, GE's escalation policy has been revised downward to a 10% ceiling. This policy is an assurance by the company that any upward adjustment of the product price in effect at the time of shipment will not exceed a stated per cent of the price in effect at the time the order was placed.

GE's Power Transformer Depart-



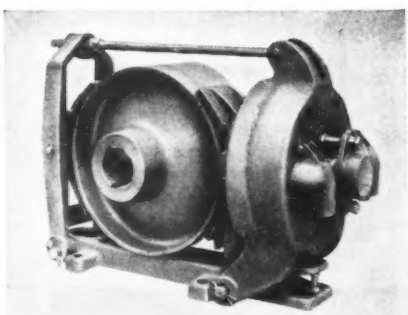
Quinorgo Electrical Insulations are high dielectric, heat-resistant sheet materials made of purified asbestos for use on equipment up to 130 C. Available in tape and roll forms.

How Cutler-Hammer, Inc. protects coils of giant Supermagnets with Quinorgo® electrical insulation

PROTECTING COILS in giant C-H Supermagnets is difficult because of the heat generated by the tightly packed pancake coils. This problem is complicated by the need to utilize every bit of space to gain maximum lifting power. After experimenting with many insulating materials, including coatings, Cutler-Hammer chose Quinorgo No. 3000 for Supermagnet strap insulation.

Quinorgo fully meets the exacting requirements of Cutler-Hammer—as well as those of other well-known electrical manufacturers. Quinorgo is a moderate priced, high-temperature insulation, for use alone or in "composites." Available in two types with slightly different impregnation characteristics. Both types combine high dielectric and mechanical strengths, with uniform texture and caliper. They maintain these properties under operating temperatures up to 130 C.

Quinorgo Electrical Insulations may lower your production costs and improve product performance. For more information write for the 32-page booklet "PYROLYSIS PROTECTION PAYS WELL" (EL-40A) Johns-Manville, Box 60, New York 16, N. Y. In Canada, 199 Bay Street, Toronto 1, Ontario.



Cutler-Hammer's success with Quinorgo No. 3000 on giant Supermagnets led the company to use this insulation as a component of the series wound Type "M" magnetic brakes which are so widely known throughout the industry.

JOHNS MANVILLE JM PRODUCTS

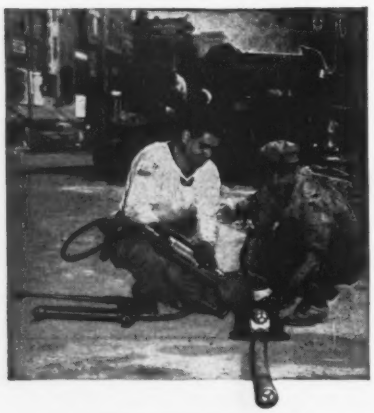
Johns-Manville ELECTRICAL INSULATIONS

On-the-Job

Cutting

OF POWER CABLE

Made easy



NEW HYDRAULIC

MANCO GUILLOTINE

Bites right through underground primary cable. Accommodates all sizes of cable to 3½" O. D. Fast, portable . . . can be used in any position. Ideal for use in maintenance splicing and renewing cable as well as high speed salvage cutting. Blades available for no deformation cutting to 2½".

Model 30

WIDE VARIETY OF PUMP UNITS

The Guillotine Model 30 is available with manual, compressed air, or electric hydraulic pumps.

MANCO MFG. CO.

BRADLEY, ILL.

SEND COUPON OR WRITE

MANCO MFG. CO., Dept. EW-5-C, Bradley, Ill. Send me information and prices on Guillotine Model 30.

Name.....

Firm.....

Street.....

City..... Zone..... State.....

ment also announced a similar price increase on power transformers, transformer apparatus, and feeder voltage regulators. This department also revealed a price slash of 10% on current-limiting reactors. The reduction was made possible through the use of aluminum instead of copper conductors. GE engineers said there is no appreciable increase in either size or weight of the new reactors, despite aluminum having a lower conductivity than copper.

Dow Corning Presents New Magnet Wire Enamel

After eight years of research work Dow Corning Corp, Midland, Mich., last week presented a new silicone-base magnet wire enamel to wire companies for further testing and evaluation.

Dow engineers report that tests to date indicate that this new wire enamel has about the same life expectancy at 200 AC as the best organic magnet wire enamels have at their top operating temperatures of 105 C. Flexibility and scrape abrasion resistance compare favorably with those of the better organic wire enamels. Dow Corning 1360 wire enamel also shows superior resistance to a wide variety of solvents, oils, and salt water.

Laborating tests indicate that the new wire enamel is suitable for continuous, long term operation at temperatures in the range of 300 to 400 F.

There is considerable evidence to indicate that it merely remains to complete the evaluation of Dow Corning 1360 by additional motor life temperature tests, to determine its acceptance as a Class H electrical insulating material.

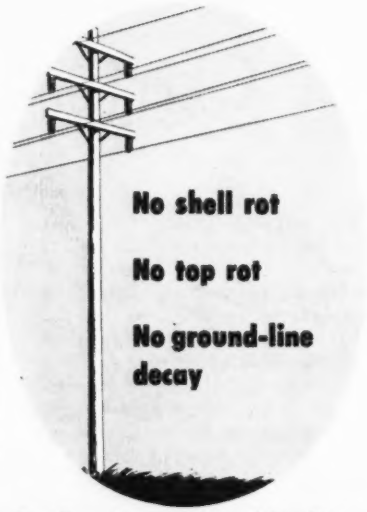
Several motors wound according to standard commercial procedures with magnet wire coated with this new enamel are now undergoing accelerated life testing. They are still in excellent condition after more than 1,500 hours of operation at 225 C (437 F).

Where space is not a limiting factor, Class H insulating materials now available will give maximum life and reliability to electric machines. Where space is a major consideration, as in fractional or miniature Class H motors, or in electronic devices, life and reliability can be greatly increased through use of this new Dow Corning 1360 magnet wire enamel.

Cedar Poles last longer when full-length treated with

CHAPMAN®

Penta Preservative



Really clean • Non-bleeding
Deep and uniform penetration

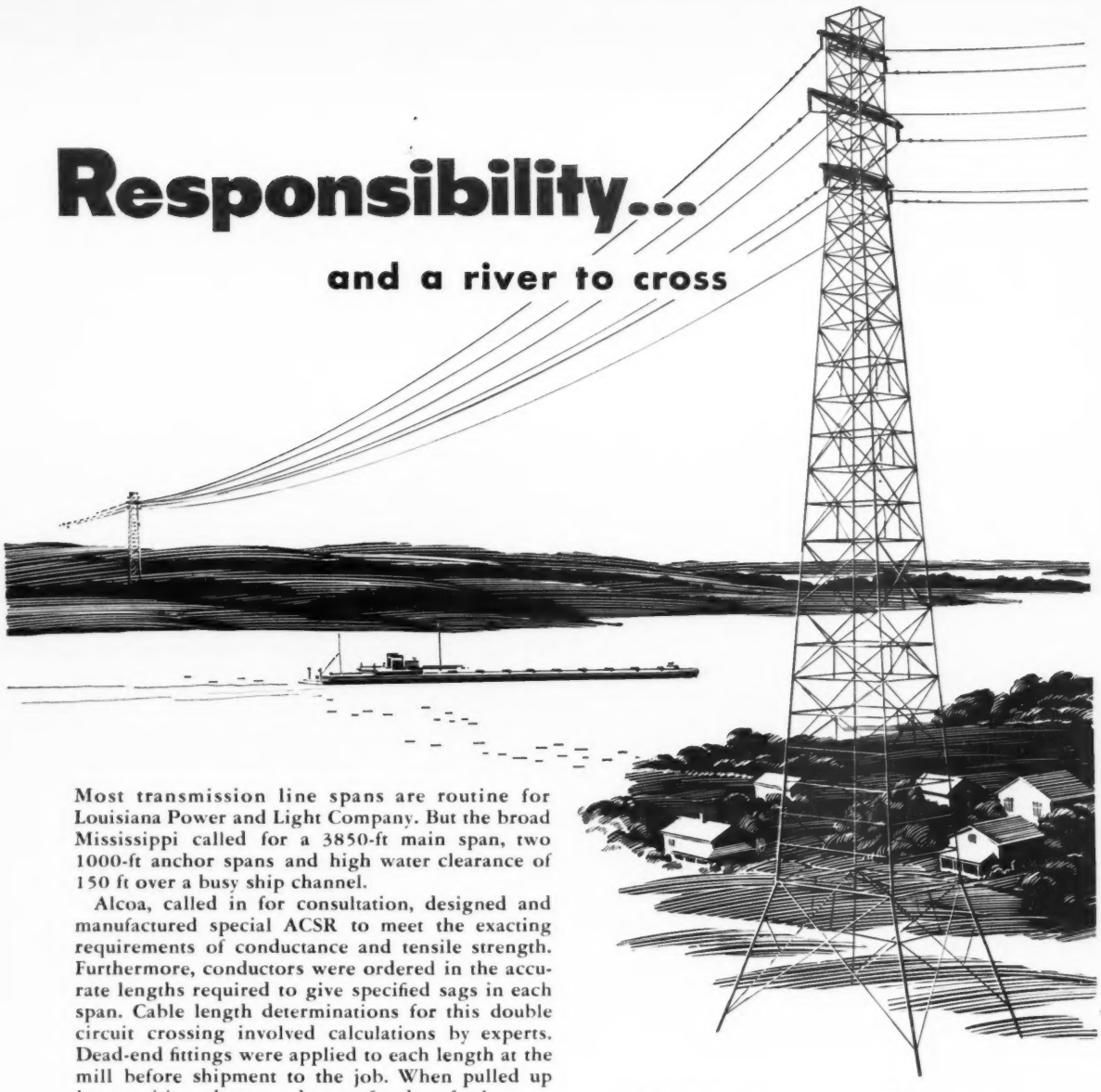
It will pay you to specify clean PENTA treatment for cedar poles. Write for names of companies supplying PENTA-treated products.

CHAPMAN CHEMICAL COMPANY

Dermon Building, Memphis 3, Tenn.

Responsibility...

and a river to cross



Most transmission line spans are routine for Louisiana Power and Light Company. But the broad Mississippi called for a 3850-ft main span, two 1000-ft anchor spans and high water clearance of 150 ft over a busy ship channel.

Alcoa, called in for consultation, designed and manufactured special ACSR to meet the exacting requirements of conductance and tensile strength. Furthermore, conductors were ordered in the accurate lengths required to give specified sags in each span. Cable length determinations for this double circuit crossing involved calculations by experts. Dead-end fittings were applied to each length at the mill before shipment to the job. When pulled up into position, these conductors fitted perfectly.

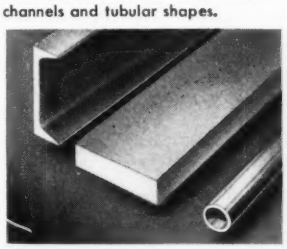
Unusual service? Not for Alcoa. We co-operate readily because we believe that the best installations are just as important as the best products. This is your guarantee of satisfaction with Alcoa Aluminum Electrical Conductors. Aluminum Company of America, 2100-S Alcoa Building, Pittsburgh 19, Pa.

Alcoa Aluminum

ALUMINUM COMPANY OF AMERICA

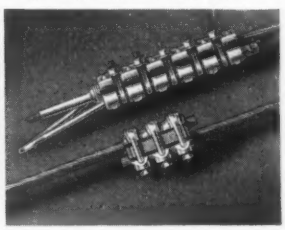
"SEE IT NOW" with Edward R. Murrow —CBS-TV every Sunday . . . brings the world to your armchair. Consult your newspaper for local time and channel.

Alcoa Aluminum Bus is available in rectangular and solid round bars, channels and tubular shapes.



Alcoa Aluminum Electrical Conductors include ACSR, solid and stranded aluminum wire, bare or covered.

Alcoa's full line of aluminum accessories, is correctly designed for use with all aluminum conductors.



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We build them . . . with modern materials and engineering techniques . . . plus up-to-date design . . . based on years of experience.

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Here is a typical air-cooled 500 KVA class B type. 80°C Rise. 3 phase 4160 Delta Primary ± 2½% full capacity taps. 240x480 Delta Secondary. Available from 30 to 2500 KVA with voltages from 2400 to 15 KV.

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Indoor or Outdoor
3 KVA to 15 KVA
Air-Cooled

*If you think this is just an advertising adjective we invite you to contact us . . . we will tell you who buys Magnatran —the better transformers . . . and if you want, show you how we build them.

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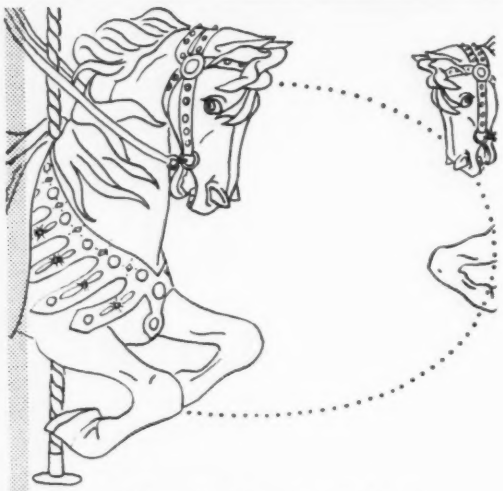
MAGNATRAN ®

He can afford to go around in circles



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Applied and cured in conventional magnet wire tower equipment, the new wire enamel provides a heat stable electrical insulating coating for bare magnet wire.

It has been observed that long life at elevated temperatures is obtained when copper magnet wire is protected against oxidation.

Capable of being easily applied to solid or clad copper wire by die or dip coating, Dow Corning 1360 wire enamel cures at about the same rate as conventional vinyl-formal enamels. Dow Corning laboratories have coated No. 18 AWG wire to heavy resin thickness at a speed of 10 ft per minute in five-ft towers held at 500 C. Nickel plated copper wire and aluminum magnet wire coated with the enamel have both shown greater heat stability than similarly coated plain copper wire.

Therefore, until further test data are obtained, Dow Corning engineers recommend consideration of either aluminum or nickel plated wire for use at temperatures of 180 C (356 F) or higher. Wherever maximum life at high temperature is required, only Class H insulating components and materials should be used with Dow Corning 1360 wire enamel.

Westinghouse Reports 1st Q Sales, Net Rise

Westinghouse Electric Corp's sales in the first quarter of 1953 increased 18%, net income 8.9%, and earnings per share 8.3% over the first quarter of 1952.

Sales for the first three months of 1953 totaled $382,226,000 compared with $323,820,000 in the corresponding quarter last year.

Net income was $16,858,000 compared with $15,485,000 a year ago, and earnings per share for the 1953 quarter equaled $1.04 against 96¢ a year ago.

President Gwilym A. Price said provisions for federal income and excess profits taxes in the first quarter of 1953 totaled $29,271,000, an increase of 5.4% over the $27,763,000 set aside for taxes during the same period last year.

"Although the excess profits tax law is scheduled to expire June 30—and we sincerely believe that it should—this tax provision for the first quarter was computed at the full 30% rate," Price explained. "However, should

Give fire half a chance and it will over-run you like a swarm of ants.

You must stamp it out anywhere it shows itself. In the substation, power plant, garage.

That calls for a battery of strategically placed KIDDE Portable Fire Extinguishers.

Get the ants out of your plants.
Call your KIDDE dealer today.

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TRANSFORMER HANGERS

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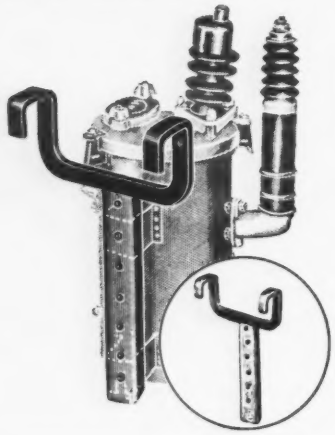
THIEL

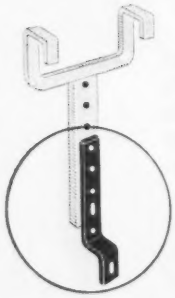
It's a Mark of Quality

Formed from heavy gauge steel . . . hot-dip galvanized for longer life. Available in two sizes. Designed to meet NEMA specifications.



Model	1-Phase	3-Phase	Weight
T-1	3-15 KVA	9 KVA	16¼ lbs.
T-2	25-37-50 KVA	15-45 KVA	27¼ lbs.

HANGER KICKERS



Model K-1 for use with T-1 hanger. Adjusts to four positions. Model K-2 for use with T-2 hanger adjusts to five positions. Kickers and bolts are hot-dip galvanized.

Hangers and Kickers in Stock

THIEL

TOOL AND ENGINEERING CO.

1417 NORTH MARKET ST.

ST. LOUIS 6, MISSOURI

the tax expire in mid-year, as now scheduled, the first quarter provision for this tax might properly be reduced by approximately one-half, and net income for the quarter would be increased to $19,171,000, equal to $1.19 per common share."

MANUFACTURING BRIEFS

Final phase of Crouse-Hinds Co's expansion program, started in 1946, calls for construction of a new 45,000-sq ft metal molding foundry. Erection of this building by next fall completes a seven year expansion program that will add a total of 180,000 sq ft to present manufacturing facilities.

A. O. Smith Corp has completed transfer of Burkay commercial water heater manufacture from Toledo, Ohio, to Kankakee, Ill., where production now is integrated with the Permaglas-Heating Division.

MEETINGS CALENDAR

Illuminating Engineering Society
Southern Regional Conference, Sedgefield Inn, Greensboro, N. C., May 18–19; Great Lakes Regional Conference, Syracuse Hotel, Syracuse, N. Y., May 25–26; National Technical Conference, Hotel Commodore, New York, Sept. 13–17.

Third International Congress on Electro-Thermics
Paris, France, May 18–23.

Electrical Manufacturers' Representatives Association of Michigan, Inc.
1953 Electrical Exhibition, State Fair Grounds, Exhibition Bldg., Detroit, May 19–22.

National Telemetering Conference
Edgewater Beach Hotel, Chicago, May 20–22.

Northwest Electric Light & Power Association
Accounting & Business Practice Section and Personnel & Safety Section, Newhouse Hotel, Salt Lake City, Utah, May 20–22.

Pennsylvania Electric Association
Systems Operation Committee, Skytop Lodge, Skytop, Pa., May 21–22; Prime Movers Committee, Beachcombers Resort Hotel, Erie, Pa., May 28–29.

Southeastern Electric Exchange
Industrial Power Sales Conference, Fort Sumter Hotel, Charleston, S. C., May 21–22; General Sales Conference, Atlanta Biltmore Hotel, Atlanta, Ga., Nov. 4–6.

Interstate Power Club
Joint Meeting with Power Engineer's Association, Lawn Club, New Haven, Conn., May 22; Hotel Martinique, New York, Oct. 5; Hotel Martinique, New York, Dec. 7.

National Association of Purchasing Agents
Annual Meeting, Statler Hotel, Los Angeles, May 24–27.

***National Association of Electrical Distributors**
45th Annual Convention, Conrad Hilton Hotel, Chicago, May 24–29; Spring Meeting, Pacific Zone, Huntington Hotel, Pasadena, Calif., June 8–10; Fall Meeting, Pacific Zone, Hotel del Coronado, Coronado, Calif., Oct. 11–14.

Edison Electric Institute
Meter-Service Committee, Wentworth-

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plugs 'em easier-and better!

Duxseal is a nonhardening adhesive plastic compound made with an asbestos base. Stays plastic, will not slump, melt or run under ordinary temperatures. Clings to duct walls and cables but flexes with expansion and contraction. Unaffected by water and gases—does not react with rubber, metals or painted surfaces. For full details write Johns-Manville Box 60, New York City 16; in Canada, 199 Bay St., Toronto 1, Ontario.

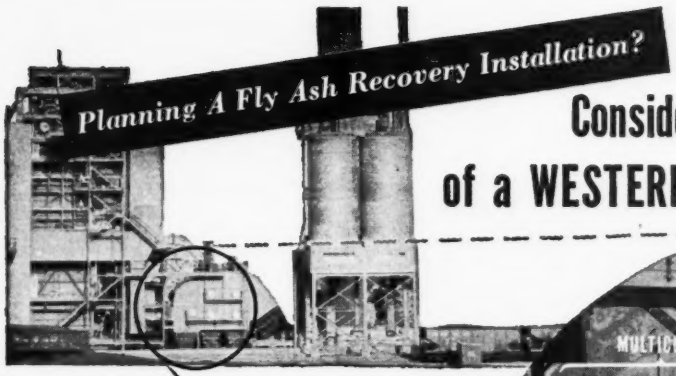
Duxseal is a general utility sealing and caulking compound for duct openings, potheads, bushings and terminal boxes. Use like putty as it comes from the package

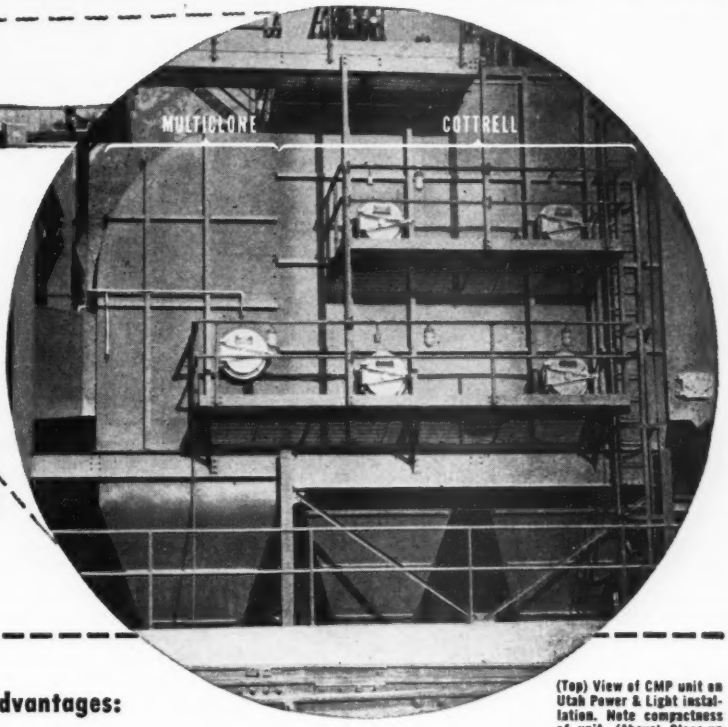
Johns-Manville

SEALING COMPOUNDS

Planning A Fly Ash Recovery Installation?

Consider these important advantages of a WESTERN PRECIPITATION CMP UNIT!





(Top) View of CMP unit on Utah Power & Light installation. Note compactness of unit. (Above) Close-up of same installation.

IF YOU are planning the installation of any type of fly ash recovery equipment—mechanical or electrical—it will pay you to investigate the extra advantages to be gained by installing a CMP Unit designed, engineered and constructed under *one* responsibility by Western Precipitation Corporation—*leaders in both electrical and mechanical recovery fields!*

Combines Mechanical and Electrical Advantages:

A CMP (Combination Multiclone-Cottrell Precipitator) Unit combines—in one compact installation—both mechanical and electrical recovery principles, so that maximum benefit is obtained from the advantages inherent in each method. The MULTICLONE section centrifugally cleans the gases of the larger and heavier fly ash particles (down to a few microns in diameter)... and the COTTRELL Precipitator then electrically removes the very small particles remaining in the gases. This combination arrangement has important advantages:

1. Using the MULTICLONE for cleaning out the heavier particles permits the bulk of the recovery operation to be performed with relatively low-cost equipment.

2. Using the COTTRELL for final clean-up insures unusually high recovery efficiency—approaching theoretically perfect, if desired—with a high efficiency, compact Precipitator unit.

3. Each type of unit—MULTICLONE and COTTRELL—can be arranged for its most efficient application. MULTICLONES may be connected to each separate boiler, if desired, and their draft requirement cut out when the boiler is down... while a central COTTRELL handles all gases and operates at higher efficiencies, with continued low power cost, when one or more boilers are down.

4. During soot-blowing periods, or while warming up cold boilers, the MULTICLONE efficiency usually increases, preventing overloads of detrimental carbon from reaching the COTTRELL.

Only Western Precipitation Combines Multiclone and Cottrell "Know-How"—In ONE Organization!

A vital factor in obtaining maximum efficiency and economy in CMP installations is the proper balance of mechanical and electrical recovery equipment to the individual requirements of *each* application. Western Precipitation is unique in that it not only pioneered the commercial application of COTTRELL Electrical Precipitators over 43 years ago, but also has been a leader for many years in the *mechanical* recovery field with its widely-recognized MULTICLONE Collectors.

Result—Western Precipitation has the all-important "know-how" and experience in BOTH fields... knows from first-hand experience how to fit the *right* equipment in the *right* place, to do *your particular* job ... and can provide the complete installation under ONE responsibility and ONE overall guarantee!

Let Our Experienced Engineers study your recovery requirements and make recommendations on the equipment best suited to your operations. A wire, phone call or letter to our nearest office places this unique "Know-How" at your service, without obligation!

Send for descriptive literature!

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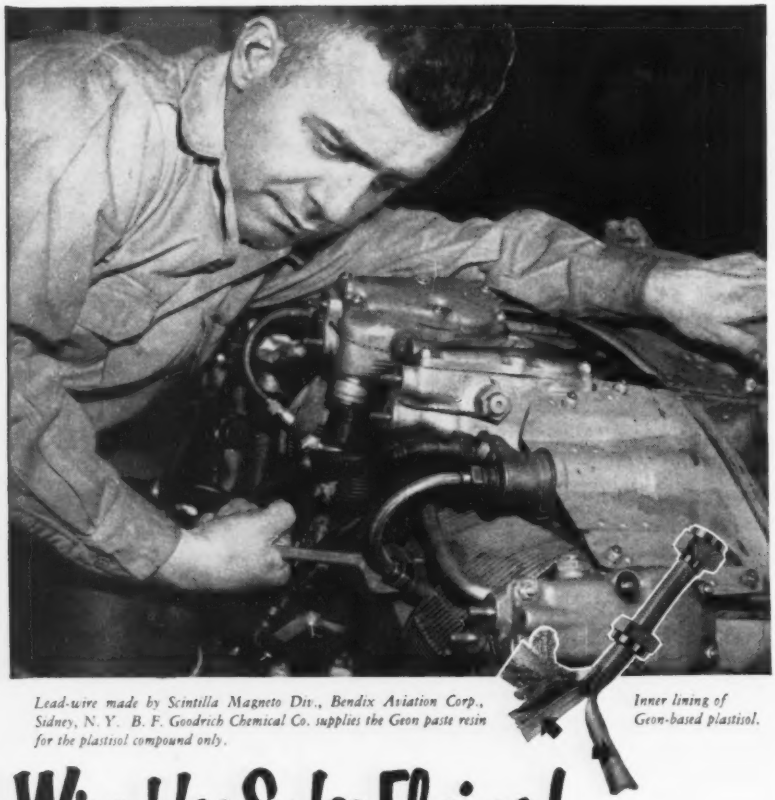
B. F. Goodrich Chemical *raw materials*



Lead-wire made by Scintilla Magneto Div., Bendix Aviation Corp., Sidney, N. Y. B. F. Goodrich Chemical Co. supplies the Geon paste resin for the plastisol compound only.

Inner lining of Geon-based plastisol.

Wired for Safer Flying!

Geon helps protect new lead-wire assembly

AIRCRAFT engine lead-wires for carrying high voltage from the transformer coil to spark plug were rubber covered nickel braid. They frequently deteriorated quickly from the effects of ozone and engine heat. Result—*higher* maintenance costs, *lower* safety factor.

After months of experimenting, engineers came up with the answer: a lead-wire with an inner lining of plastisol made from Geon paste resin, plus two other layers of plastisol between the nickel braid.

This lightweight, vinyl plastic impregnated lead-wire has the strong, waterproof, *ozone and heat-resistant* protection that was needed. A flexible metal tube insert for enclosing the wires is no longer required. And this Geon-helped lead-wire also resists the effects of *mineral spirit solvents* which are flushed on the engine during cleaning operations.

Plastisols made from Geon paste resin can be molded, cast, coated or dipped. They can be made resistant to oils, greases, heat and cold, abrasion and many chemicals. Perhaps Geon paste resin, or other Geon materials, can help you improve or develop more saleable products. For technical bulletins, please write Dept. GJ-5, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

GEON RESINS • GOOD-RITE PLASTICIZERS...the ideal team to make products easier, better and more saleable
GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON colors

by-the-sea, Portsmouth, N. H., May 25–27; 21st Annual Convention, Convention Hall, Atlantic City, N. J., June 1–4; Hydraulic Power Committee, Portland, Ore., June 15–16.

American Institute of Electrical Engineers
Conference on Electric Heating sponsored by Committee on Electric Heating and Michigan Section, AIEE, Detroit-Leland Hotel, Detroit, May 26–27; Summer General Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J., June 15–19; Pacific General Meeting, Hotel Vancouver, Vancouver, B. C., Sept. 1–4; Middle-Eastern District Meeting, Daniel Boone Hotel, Charleston, W. Va., Sept. 29–Oct. 1; Fall General Meeting, Muehlebach Hotel, Kansas City, Mo., Nov. 2–6.

Public Information Program
Steering Committee, Hotel Traymore, Atlantic City, N. J., June 1; Steering Committee, Edgewater Beach Hotel, Chicago, Oct. 21; Workshop Conference, Edgewater Beach Hotel, Chicago, Oct. 22–23.

California Municipal Utilities Association
Annual Conference, Clift Hotel, San Francisco, June 9–12.

New England Meter Engineers
General Electric Co.'s Meter Plant, West Lynn, Mass., June 12.

American Welding Society
Exposition held in conjunction with National Spring Technical Meeting, Shamrock Hotel, Houston, Tex., June 16–19.

Wisconsin Utilities Association
Accounting Section Convention, Schwartz Hotel, Elkhart Lake, Wis., June 21–23; Sales-Service Section Convention, Schroeder Hotel, Milwaukee, Nov. 11–13.

Michigan Electric Association
Annual Meeting, Mackinac Island, Mich., June 21–24.

Canadian Electrical Association
Annual Convention, Manoir Richelieu, Murray Bay, Que., June 25–27.

American Society of Mechanical Engineers
Semi-Annual Meeting, Statler Hotel, Los Angeles, June 28–July 2; Fall Meeting, Sheraton Hotel, Rochester, N. Y., Oct. 5–7; Annual Meeting, Statler Hotel, New York, Nov. 29–Dec. 4.

American Society for Testing Materials
Annual Meeting Chalfonte-Haddon Hall, Atlantic City, N. J., June 29–July 3.

International Association of Electrical Leagues
18th Conference, Fairmount Hotel, San Francisco, Aug. 5–8.

Northwest Public Power Association
Accounting Section, Monticello Hotel, Longview, Wash., Sept. 17–18.

Maryland Utilities Association
Fall Conference, Cavalier Hotel, Virginia Beach, Va., Sept. 18–19.

Rocky Mountain Electrical League
50th Annual Fall Convention, Broadmoor Hotel, Colorado Springs, Colo., Sept. 20–23.

Instrument Society of America
8th National Instrument Exhibit, Sherman Hotel, Chicago, Sept. 21–25.

International Association of Electrical Inspectors
Silver Jubilee Meeting, Edgewater Beach Hotel, Chicago, Sept. 21–26.

National Electrical Industries Show
Sponsored by Eastern Electrical Wholesalers' Association, 69th Regiment Armory, New York, Sept. 29–Oct. 2.

***Electric League of Western Pennsylvania**
4th Industrial Electric Exposition, William Penn Hotel, Pittsburgh, Oct. 6–8.

Iowa Utilities Association
Management Conference, Hotel Fort Des Moines, Des Moines, Oct. 12–13.

American Standards Association
4th National Standardization Conference and 35th Annual Meeting, Waldorf-Astoria, New York, Oct. 19–21.

National Electrical Manufacturers Association
Annual Meeting, Haddon Hall, Atlantic City, N. J., Nov. 9–12.

*Addition this week.

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CHASE® COPPER BUS CONDUCTORS WITH ANY OTHERS . . . . . for capacity . . . for copper savings . . . for efficiency

Chase ventilated square tube buses can cut your copper requirements up to 36% as compared with flat rectangular bars.

The current ratings of some of the Chase ventilated square tube buses are given in the table to the right. Bear in mind that the square tube bus is a one-piece bus and is not a composite bus consisting of two or more parts.

Send for Chase Copper Bus Conductor booklet giving information on Chase ventilated square tube, flat rectangular and round copper tube buses.

CURRENT CARRYING CAPACITY OF ONE-PIECE BUS		
	Square Inches	Current Rating at 40° C. Rise
7 x 7 x 3/8 Ventilated	9.06	7760
8 x 8 x 5/16 Ventilated	8.80	8400
9 x 9 x 1/4 Ventilated	7.93	8560

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as Marked

When it's a Haartz-Mason made tape *you know* it's full length . . . full weight. *You know* it's full strength in substance. *You know* its adhesive stays *fresh longer. You know* there's no better tape made than Paramount, Stronghold and Paraplastic . . . because they're Guaranteed.

Haartz-Mason, Inc.

WATERTOWN 72, MASS.

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All guaranteed accurate length — accurate weight as marked.

CATALOGS • BULLETINS

• **ADJUSTABLE LIGHTING:** Bulletin 132. A new catalog covering the entire Swivelier line, which consists of over 300 units to meet every adjustable lighting need has been released. The 40-pg catalog is in two colors with a five-color center insert which describes Swivelier "Vogue-Lites," modern lamps for modern interiors. Copies may be obtained by writing to Dept S, Swivelier Company, Inc, 43-34 Street, Brooklyn 32, New York.

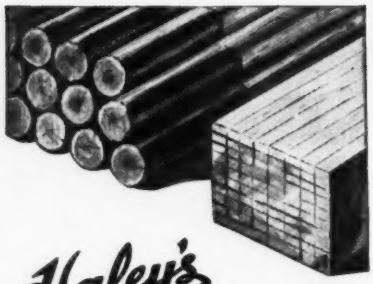
• **ELECTRICAL EQUIPMENT FOR IRRIGATION:** A new bulletin on how to select and apply electric equipment for irrigation wells has been announced as available from the General Electric Company, Schenectady 5, N. Y. The 8-pg bulletin, designated GEA-5917, points out the advantages of electric motor drives for irrigation pumps and lists the equipment needed to install an electric water-pumping system. Design features and benefits of G-E Tri-Clad vertical motors are outlined in the well-illustrated publication.

• **TELEMETERING:** A new two-color booklet describing General Electric's complete line of system-wide telemetering equipment has been announced as available from the company, Schenectady 5, N. Y. The profusely illustrated 8 pg bulletin, GEA-5746, describes design features, performance, circuits, applications, and advantages of the G-E line. It contains information on telemetering transmission channels, including carrier-current, microwave, wire-line, and a diagram of G-E Type TF telemetering equipment in a standard power transmission system. The booklet points out that G-E telemetering equipment is available as a co-ordinated system, with every component designed specifically to work in conjunction with all other components.

• **CAST STEEL VALVES:** Edward Valves, Inc, East Chicago, Indiana, today announced publication of a new 56 pg catalog covering their cast steel valves. Included is complete information on globe, angle and check valves in 300, 600, 900 and 1500 lb pressure classes. Parabolic disk valves for hand or motor control of volume are also described in detail. Copies of the catalog may be obtained by writing to Department CS.

• **CONSTRUCTION MATERIALS:** A new, complete catalog has just been issued. Covering renewable time-delay fuses, one-time fuses, plug fuses, fuse holders, and copper link fuses, the catalog makes use of numerous illustrations and drawings. A technical data section is also incorporated in the catalog and covers such subjects as how a fuse operates, maintenance hints, excerpts from the 1951 National Electrical Code pertaining to fuses, and dimensions of fuses and fuse holders. The catalog is available, upon request, from General Electric Company, Bridgeport 2, Connecticut.

• **ELECTRICAL EQUIPMENT:** Electrification of all processing operations in the lumber industry is described in a new 50-pg book now available. Standard and special equipment is described and application data is provided. Freely illustrated with on-the-job photographs, this book takes the reader on a tour of a typical lumber mill—stopping to describe some 21 phases of the application of electric power. Drives for all applications are explained and illustrated, including log-haul, cutoff-saw, hydraulic barker and chipper drives. For quick reference, there is a sawmill drive application chart. For a copy of this book,



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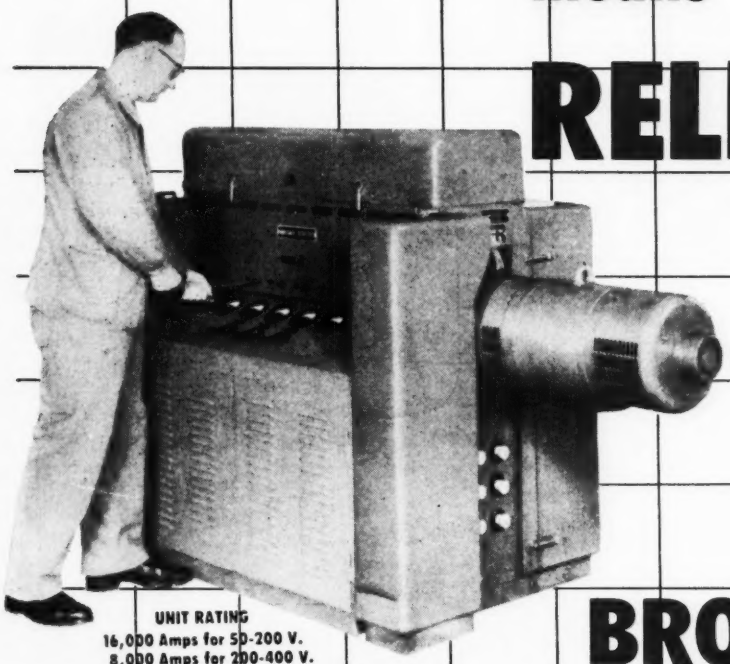

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- ***The ELECTRO-CHEMICAL INDUSTRY*** can now have the benefits of UNPRECEDENTED EFFICIENCY, LOWER POWER BILLS and TROUBLE FREE OPERATION.
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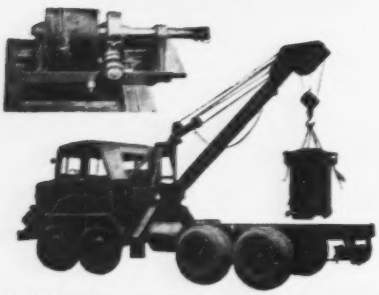

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No. 79—KRANE KAR *No. 70—Truck Equipment*

THE ORIGINAL SWING BOOM MOBILE CRANE WITH FRONT-WHEEL DRIVE AND REAR-WHEEL STEER
2½, 5, AND 10 TON CAPACITIES
KRANE KAR
TRADE MARK REGISTERED
SILENT HOIST & CRANE CO.
862 63rd ST., BROOKLYN 20, NEW YORK

B-5298, write Westinghouse Electric Corporation, Box 2099, Pittsburgh 30, Pennsylvania.

• **ROTARY PUMPS:** Worthington Corporation offers a new bulletin, known as W-483-B2, on Heavy Duty Rotary Pumps. Covering both the Herringbone Gear Type, with capacities to 5,000 gallons-per-minute, pressures to 100 pounds per square inch; and the Sliding-Van Type, with capacities to 1,000 gallons per minute, pressures to 200 pounds per square inch, the new bulletin is complete with fields of application, coverage charts, mountings and dimensions. Engineering Data in the new bulletin includes a viscosity conversion table, Relation of A.P.I. Hydrometer Scale to Specific Gravity, and a Viscosity-Temperature Chart for Fuel Oils. Readers may obtain a copy of the bulletin by directing requests to the Reciprocating Pump Division, Worthington Corporation, Harrison, N. J.

• **BUYERS GUIDE:** The 1953 edition of the G-E Instrument Transformer Buyer's Guide, containing basic, up-to-date information on the complete General Electric line, has been announced as available from the Company at Schenectady 5, N. Y. The fully illustrated, 102-pg publication, GEA-4626F, contains ratings, ASA accuracy classifications, and prices of all G-E indoor and outdoor potential and current transformers. Listings of ratio and phase-angle tests, together with tables covering the mechanical and thermal limits of current transformers, are included.

• **WEED CONTROLS:** A 4 pg folder is available on Brulin Chemical Weed Controllers. Four types of weed and brush control products and their applications are presented. Brulin Non-Selective Weed Killer for high efficiency, low cost destruction of all types of vegetation; Brulin Brush-Off for selective extermination of tough species such as maple, ash and oak; Brulin's Dual Purpose Weed Control for use where there is danger of spray drift injuring adjacent vegetation; and Brulin 2, 4-D Liquid Weed Killer for control of a large variety of weeds without injury to most types of grass. A list of outstanding companies using Brulin Weed Killer is also included with the folder. This information may be obtained by writing to Mr. Ted Sass, Vice President.

• **ALLOY METAL WIRES:** The Alloy Metal Wire Company of Prospect Park, Pa. has published a folder showing clearly all the steps in the manufacture of quality alloy metal wire. Included in the folder are a series of photographs depicting uses of Alloy Metal wires of various compositions. Among these are such products as welding rods, wire for automatic welding equipment, electronics equipment, woven wire cloth, spring and various consumer applications in jewelry, kitchen equipment, etc. At the end of the folder, there is a brief description of the new group management plan recently instituted at the Alloy Metal Wire Company. Copies are available without charge.

• **FLUORESCENT LAMP BALLASTS:** A new 16-pg, two-color bulletin on fluorescent lamp ballasts for residential, commercial, and industrial uses has been announced as available from the General Electric Company, Schenectady 5, N. Y. The booklet (GEA4950E), which contains photographs and wiring diagrams of the equipment, gives specifications of switch-start, trigger-start, slimline, circline, germicidal, and dc operation ballasts. In addition, ballasts for instant-start lamps, series ballasts with sequence starting, multiple use of slimline ballasts, and high voltage lighting for commercial buildings are explained. The problems of frequency, operating temperatures, noise, moisture and radio interference are also noted.

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FOR THE LARGEST POWER DAM OR THE SMALL HAND OPERATED GATES.

Murray Gate Hoists are designed and built in a wide range of capacities—from less than one ton to over a hundred tons . . . from the smallest hand operated to the largest motor operated gate hoist.

In over 50 years of designing and building gate hoists we have developed many designs for the different types of gate hoist problems.

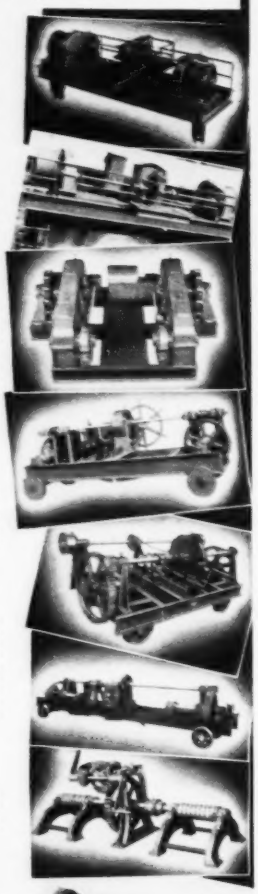
We may have designs and patterns that will fit your requirements.

In planning gates or gate hoists, we suggest you write us before your plans for the project as a whole are complete . . . it may save expense and important preparation time.

We also build gate hoists especially from your plans and specifications, as desired.

Illustrated above is the large installation at Cabinet Gorge Dam on Clark Fork River, Idaho, as an example of the use of Murray power-dam gate hoists.

Write for complete information and engineering recommendations.



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Manufacturers Since 1883
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Solenoid operated valves get extra-long life when . . .

HIGH-HEAT TAPE helps turn on the steam!

What makes "Scotch" Electrical Tape No. 27 ideal for high-heat insulating, holding or harnessing? Glass-cloth backing and thermosetting adhesive.

That's why Actown Manufacturing Co., Chicago, uses this tough tape on solenoid coils which electrically control valves manufactured by James P. Marsh Corporation, Skokie, Illinois. These valves are built to handle live steam, as well as all types of liquids and gases in refrigerating, processing and chemical handling.

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Dependable insulation is vital on installations like this, as it is on *every* high-heat application.

Examine your high heat insulating requirements and keep a big supply of "Scotch" Electrical Tape No. 27 on hand for them. Be ready for the *hot* spots before they become *trouble* spots!

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The term "Scotch" and the plaid design are registered trademarks for the more than 200 pressure-sensitive adhesive tapes made in U.S.A. by **Minnesota Mining & Mfg. Co., St. Paul 6, Minn.**— also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: 122 E. 42nd St., New York 17, N. Y. In Canada: London, Ont., Can.

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IMPROVED CABLE PULLING COMPOUND

The "old reliable" IMPROVED compound . . . just brush it on cable . . . unaffected by summer heat or zero temperature . . . clean to handle . . . easy to wipe off . . . sticks to sheath even in water-filled ducts . . . actual dynamometer tests show greatly reduced pulling stresses . . . send for further data and free working sample NOW.

and for wires with rubber or other coatings, use

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Will not affect rubber or other coatings . . . excellent for nonmetallic cable . . . permanent . . . allows easy wire removal in later years . . . nonevaporating . . . needs no mixing . . .will not separate or harden . . . light, clean to use, can be washed off with water. Send for further data and free working sample NOW.

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For Every Complete or Auxiliary
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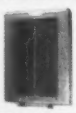
ALL-ELECTRIC HEATERS
Check These ELECTROMODE Advantages

HOME MODEL WA



Handsomely styled Wall-type and Portable models, capacities from 1320 to 4000 watts, for homes, offices, motels, lobbies, churches, institutions. *Wall-type Down Flo illustrated.*

INDUSTRY MODEL 14-10

Scientifically engineered Unit Heaters in Portable and Suspension-type models, capacities 1.5 to 45 K.W., for factories, isolated locations, hard-to-heat areas. *Suspension-type illustrated.*

FARM MODEL FA-15

Especially designed for the Milk House, capacities 1500 and 3000 watts. Prevents water pipes freezing, keeps area dry, aids ventilation. Also used for brooder pens and vegetable bins.

- **QUICK, EASY TO INSTALL** — No ducts, pipes, radiators
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Leader in Electric Heating Since 1929

MEETING REPORT

Nelpa Conference

Business Development Section hears talks on utility responsibility, load building

Electrical industry now has a new opportunity and responsibility to do a bigger and better job than ever before, declared B. L. England at the annual sales conference of the Business Development Section of Northwest Electric Light & Power Association. The meeting was held May 4-6 at Spokane, Wash.

But, continued the president of Edison Electric Institute and Atlantic City Electric Co, the industry must have a plan for integration of transmission lines and for new capacity to meet the recently stated policy of the Administration. This policy is that Bureau of Reclamation will build only those projects that private enterprise is unable or unwilling to undertake.

Community Program . . . In spelling out a utility's area responsibility, England stated it is to the company's own interest to do everything it properly can to assist in the advancement of its community. With individual companies serving as good, constructive citizens, the entire industry will acquire an increased stature as a national citizen, he said.

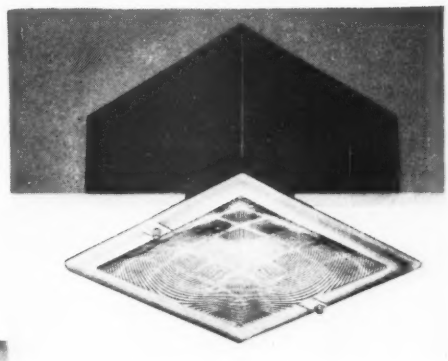
Most serious result of recent power shortage in the Northwest is the slowing down of sales effort, said John Dierdorff, president of Nelpa and vice president, Pacific Power & Light Co. He said his company needs more salesmen and has been building its sales staff slowly through the last year with the goal set at a call per customer per year.

Dierdorff declared that member companies of Nelpa will spend $330 million in the next five years for 1 million kw of capacity and new plant. There is every indication, he said, companies in western Washington and Oregon will have to take up the slack as funds for federal power construction are cut. He estimated that under a realistic federal power policy member companies would be able to double the 1 million kw of capacity they are planning. Dierdorff said construction of steam plants in the Northwest awaited solution of the question

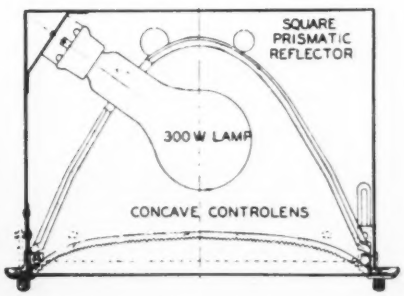
New Development of HOLOPHANE Lighting Research . . .

*CONTROLENS Units *for LOW Brightness, HIGH Efficiency*

Holophane engineering research and development skills have contributed another great advance in modern lighting technique with a new series of CONTROLENS units. These new luminaires for both horizontal and vertical lighting provide the ultimate in maintaining *high efficiency* with *low brightness.* Recessed incandescent units are equipped with *LO-BRITE *concave* CONTROLENS which concentrates a high proportion of the lamp output on the illuminated area while shielding brightness from the observer at all normal viewing angles. Wherever applicable, this principle of increased efficiency and minimum brightness is engineered into all Holophane units.

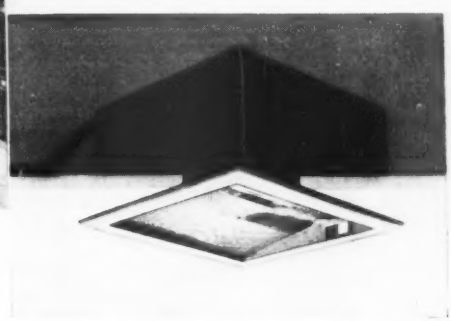


No. F-1570: Holophane In-Bilt unit with LO-BRITE Concave CONTROLENS—for "general lighting" wherever uniform illumination of working areas is required.



Sectional view through No. F-1570 showing concave CONTROLENS and square prismatic reflector.

Typical use of vertical surface lighting . . . This stock broker's board is illuminated by a row of No. F-798 Holophane vertical surface lighting units built into the ceiling. General lighting in the room is provided by No. F-1570 units.



No. F-798: Another Holophane In-Bilt unit which concentrates high output of light on vertical surface with minimum of brightness toward viewer.

Holophane

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Lighting Authorities Since 1898 • 342 MADISON AVENUE, NEW YORK 17, N.Y.

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Write for latest Holophane Engineering data on New LO-BRITE CONTROLENS lighting—no obligation.

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- Silent Operation
- Explosion Proof
- No Maintenance
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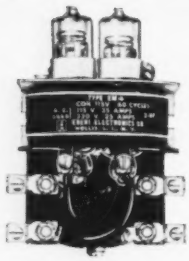

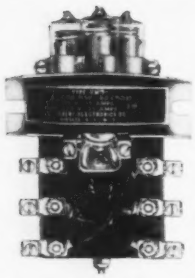

The many advantages of mercury plunger construction are now available in relays for 2 and 3 pole applications.

Compact size and high current handling capacity (up to 60 amps) permits realistic savings in cost and space. For complete details just ask for our free catalogue—and don't forget—our engineering division is ready to serve on any of your relay problems.

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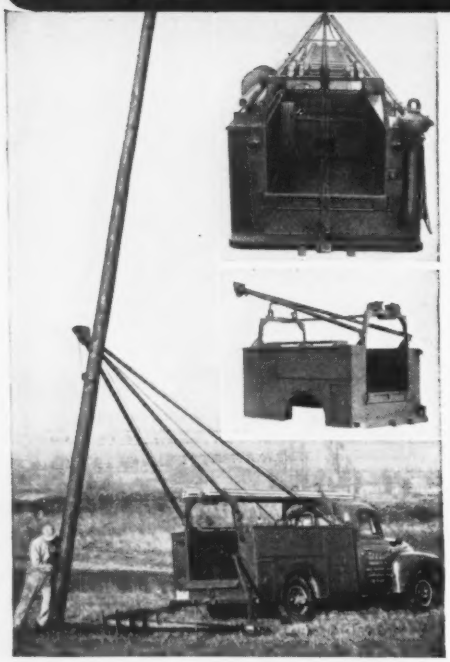
Two-Man

COMBINATION TRUCKS

Pay Dividends



With a ¾ or 1-ton truck and Tel-E-Lect "Combination" Body, you can . . .

- Dig holes and set poles up to 40'
- Handle your regular service work
- Reach a variety of jobs quicker
- Operate with two men at less cost

IT'S A COMPLETE PACKAGE, tailored for your make and model of truck. Derrick, winch and digger drive are all assembled to the body, ready for your truck chassis. Easily mounted in a few hours by your local mechanic.

Write for Bulletin

TEL-E-LECT

PRODUCTS, Inc.

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of equitable sharing of steam costs among all public and private utilities.

Electricity on Farm . . . Electricity must be used in greater quantities to increase agricultural production, stated E. G. Stahl, Pacific Gas & Electric Co. To provide sufficient food for our expanding population, electric power should be applied to irrigate more land and to supply supplementary irrigation, to process and propagate crops, to treat seeds, and to handle and mix feed for greater output of animal products. Stahl estimated that of the present 16 billion kwhr consumed on the farm, only about 6.5 billion are used for actual farming operations.

He pointed out that better reporting of data on both farm and non-farm consumers was needed. Suggestion was made that data be gathered by EEI, Rural Electrification Administration, and other groups associated with rural electricity.

New horizons in electric selling include an adequate wiring program aimed at the "low-income" groups, said Paul Brooks, Ebasco Services. Future applications of electricity, he said, cover greater lighting, and heating and cooling uses in residences. Flood lighting, electric barbeque equipment, soil heating cable, and extra radios are examples of what can be used in gardens surrounding these homes, Brooks added.

Commercial Lighting . . . Group replacement of lighting can be applied to commercial business establishments as it has in industrial plants, said R. W. Thunen, Sylvania Electric Products. Group replacement, he said, offers these benefits to customers: Lower maintenance costs, more light per kwhr, better overall appearance, less starter and ballast trouble, and higher maintained efficiency of employees. He suggested that group replacement of fluorescent lamps be initiated after 4,000 to 6,000 hours of burning, together with a complete cleaning of fixtures, to effect lowest operating cost.

By 1955, room air conditioners will be selling at an annual rate of 1 million units, A. G. Foote, Frigidaire, told the group. This compares with 341,000 units sold in 1952, he said. Air conditioners may be used in more different places in old and new homes and offices than any other appliances, he declared, but the public must be sold on the need for them to cool, dehumidify, and filter the air.

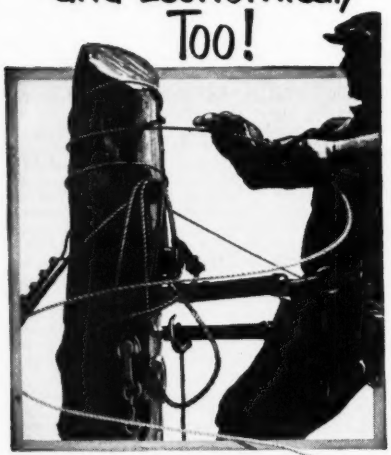
Crapo
GALVANIZED STEEL
STRAND

Strong...
to support pole structures under adverse ice and wind loadings.

Rugged...
to withstand the punishment incurred in construction and service.

Long-Life...
provided by famous *Crapo* Galvanized heavy, ductile, tightly-bonded zinc coatings.

-and Economical, Too!



● Each size and grade of time-proved *Crapo* Steel Strand utilizes the superior tensile strength of steel to the fullest advantage. Next time, *specify Crapo Steel Strand* for guys, messenger and overhead ground wires . . . and *save on maintenance!*

REINFORCE and PROTECT YOUR CONDUCTORS with Preformed ARMOR RODS

Minimize wear and chafing . . . Absorb and dissipate vibration . . . Protect against arcing and flash-overs . . . Increase holding power against slippage . . . Lessen possibilities of corrosion . . . *Reduce overall maintenance costs.*

Contact your jobber of *Crapo* Galvanized Products or write direct for further information!

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STEEL & WIRE COMPANY
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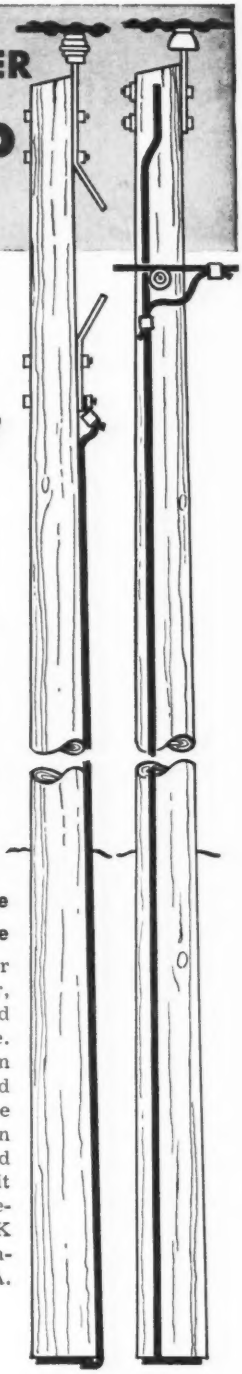
SAVE LABOR-SAVE COPPER

do a better job
WITH

Blackhawk Industries

POLE PROTECTION GROUND ASSEMBLY



✔ **lead wire permanently attached to butt plate**
✔ **available with any required length lead wire**

The pre-assembled Pole Ground Unit, ready for immediate installation . . . saves time and labor, eliminates waste of copper wire cut in the field . . . assures a strong connection under the pole. A pre-determined measure of No. 6 soft drawn copper wire is coiled and permanently attached to the copper plate. B. I.'s positive butt type Pole Ground Assemblies are available and in regular stock for all standard pole lengths and plainly marked with the pole length for which it was made. Or, they can be supplied for any required pole length as specified. BLACKHAWK INDUSTRIES' Pole Protection Ground Assemblies fully meet the requirements of R.E.A. Specification M2-2.

Write for complete catalog or spec. sheet

SPECIFY B-I WHEN YOU BUY

Sold only through Electrical Wholesalers

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Blackhawk Industries

Entrance Cable Fittings . Beam Clamps . Yard Lights Sill Plates . Locknuts and Bushings . Fluorescent Brackets . Wire Holders . Cable and Conduit Straps . Connectors . Box Supports . Conduit Entrance Caps . Grounding Assemblies . Grounding Clamps . Bar Hangers . Fish Tape . Conduit Hangers . Staples . Wood Screws . Machine Screws.

YOUR THERMAL DEMAND WATTAGE LOAD

Automatically Controlled

with

STATES

Automatic

CONTROL

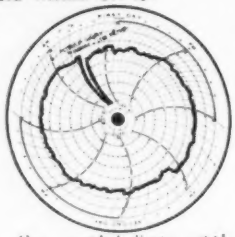
TABLE

Form "FDM" with Automatic Control of Load

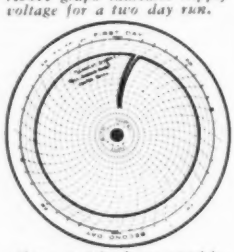
This equipment is designed to operate at and to hold the load at power factors of 100% and 50% and at a nominal voltage of 120 volts. Average watt load is held within 0.1%.

Now you can get a constant watt load and maintain it automatically with this new control unit by STATES. Proper meter registration is thus virtually assured. The Automatic Load Holder built into the STATES Control Table means, also, that you can add to the accuracy of your thermal demand testing because the average wattage throughout the test run is maintained automatically.

The Load Holder eliminates the need for supervision during the period the load is to be held accurately. It is based on the same principles as those of the automatic load holders which have been used in the factory testing department for Lincoln Meters for over 12 years.



Above graph indicates supply voltage for a two day run.



Above graph shows resulting watts due to influence of automatic load holding.

THE STATES COMPANY
3 New Park Avenue, Hartford, Conn.

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Please send latest information on Form "FDM" Thermal Demand Table.

Name ..... Title .....

Firm .....

City ..... Zone .... State .....

You'll do well to investigate the States' new versatile Form "FDM" Thermal Demand Table now.

THE STATES COMPANY

TECHNICAL LITERATURE

Piezotronic Technical Data—Brush Electronics, Cleveland, Ohio has published a 28-pg booklet describing the characteristics and applications of piezoelectric materials design and equivalent circuit data. It includes diagrams and charts and may be obtained from the Brush Electronics Co, 3405 Perkins Ave, Cleveland, Ohio.

Magnetic Iron Powders—Magnetic Powders, Inc has issued an 81-page illustrated catalog, 354, covering complete technical data, including the various photomicrographs, frequency versus Q charts, permeability rating graphs, etc, on the uses and applications of annealed carbonyl iron powders, hydrogen reduced iron powders and magnatites is available from the company, 1013 Fairview Avenue, Johnsonburg, Pennsylvania Publications please direct inquiries direct to: Mr. C. C. Neighbors.

Cable—Phelps Dodge Copper Products, 40 Wall St., New York City, N. Y. has recently issued a color pamphlet describing Styroflex Coaxial Cable, semi-flexible, aluminum sheathed, containing charts and photographs. This booklet may be obtained by writing to the company.

Elastic Constants—The American Society for Testing Materials has announced the availability of their latest edition of the ASTM Symposium of Elastic Constants. The titles and authors are as follows: Report on ASTM Task Group for Determination of Elastic Constants—Walter Ramberg. The Influence of Temperature on the Elastic Constants of Some Commercial Steels—F. Garofalo, P. R. Malenock, and G. V. Smith. Methods for Determining the Elastic Constants of Nonmetallic Materials—E. W. Kuenzi. Dynamic Methods for Determining the Elastic Constants and Their Temperature Variation in Metals—M. E. Fine. An Evaluation of Several Static and Dynamic Methods for Determining Elastic Moduli—John T. Richards. Copies of this 110-page Symposium may be obtained from ASTM Headquarters, 1916 Race Street, Philadelphia 3, Pa. at $2.00 each in heavy paper cover.

Alphatic Amides—The Armour Chemical Division, 1355 West 31st St, Chicago, Ill. has issued a 24 pg booklet describing the chemical properties and applications of high molecular weight alphatic amides. Their fields include rubber, printing inks water repellents, ceramics, wax papers, fusible coatings, powdered metals, detergents, electrical equipment and rough coatings. Copies are available without charge on request.

Pole Hardware—The Malleable Iron Fittings Co, Branford, Conn has issued a folder of their pole hardware specialties. It carries specifications and prices, drawings and test data, spar arm gain, grid gain, double grid gain accessories and connecting hardware, timber connectors, scoll models and washers. Further information about this informative booklet may be had by writing to the company. A second booklet contains data on guy clamps cable suspension clamps, attachments, eye nuts, bolt eyes, house brackets and pole mounts.

Pentachlorphenol Treatments—A progress report showing the results of fifteen years research has been published by Page & Hill, Inc., Minneapolis, Minn. Complete data photos and scales are included about such things as cedar posts exposed in tunnels from 1944-1952, red cedar posts in test plots in Minneapolis and Pearl River Louisiana. Each subject shows material, encising treating solution, treatment, location samples, retentions, conditions, penta loss and comments. Contact the company for further information.

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Our Company, a leader in the development and manufacture of electrical items for the railroads and heavy industry for more than 55 years, is looking for New Products for diversification.

Will consider outright purchase or royalty payments.

If entirely new and of interest, we will finance patent investigations and applications.

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Attention:
T. E. McDowell, Vice President
Research and Development

"No decay in this pole and it's over 31 years old,"

says J. W. Schultz of Grenada, Miss.

• "This Koppers Pole is in such good shape," continues Mr. Schultz, "I'm sure it will give good service for many more years."

This is the kind of pole service that brings substantial savings to utility companies. Savings in maintenance costs. Savings in replacement costs.

Specify Koppers Full-Length Pressure-Creosoted Poles. Through the years your operating records will prove you've made a wise investment. Write for quotations.

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WOOD PRESERVING DIVISION
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PRESSURE-CREOSOTED WOOD

For a Fast, Tight Tap That Will Never Freeze

Specify KEARNEY PROTECTED THREAD CON-NEC-TAP CLAMPS

Months or years later, they're just as easy to take off as they were to tap on. You'll save by being able to use them again and again. The Con-nec-tap's tightening threads are kept corrosion-free in a lubricated, waterproof chamber. A heavy Duronze spring washer keeps it permanently tight on the conductor despite expansion, contraction or vibration.

Con-nec-tap live-line clamps are made in a complete series for aluminum-to-aluminum taps, as well as a complete series for aluminum-to-copper connections.

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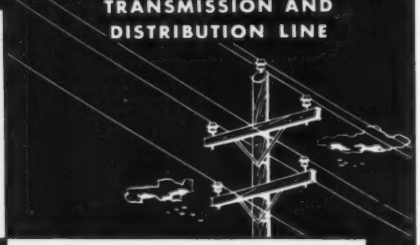
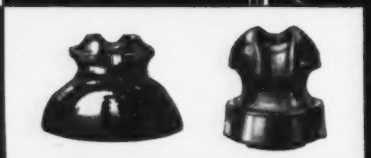
For Better Construction - For Safer Maintenance

Specify ILLINOIS PIN TYPE INSULATORS

TRANSMISSION AND DISTRIBUTION LINE



ONE PIECE AND MULTIPART



Illinois Pin Type Insulators have an established service record on transmission and distribution power lines. For top quality, superior performance and long life, specify Illinois!

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ILLINOIS ELECTRIC PORCELAIN CO.
MACOMB, ILLINOIS

BOOK REVIEWS

Metadynes

Metadyne Statics. **By Joseph Maximus Pestarini. Published by John Wiley & Sons, New York 16, N. Y. 416 pages, illustrated. Price $9.00.**

This book presents basic concepts of a class of machines to which the name "metadyne" has been applied. In certain cases operation of metadyne may be compared to the operation of electronic tubes. The steady-state characteristics are emphasized and may be referred to as "metadyne statics." Transient characteristics of the multiterminal machines when subjected to rapidly varying currents may be referred to as "metadyne dynamics." Part I of the volume carries the general theorems that may be found applying to all metadynes. Part II is an investigation of special cases of metadynes. Electrical engineers will find a brief description of some applications in operation, such as alternator voltage control, amplifier metadyne controlling the current of large d-c generator on a diesel electric locomotive, power supply for a precipitator, control of turrett and deck auxiliaries, control of switching locomotives, mine locomotives and hoists.

Valuation and Depreciation

Engineering Valuation and Depreciation. **By Anson Marston, Robley Winfrey and Jean C. Hempstead. Published by the McGraw-Hill Book Co, New York 36, 508 pages, illustrated. Price $8.00.**

This book is a revision of Marston and Agg's "Engineering Valuation" book published in 1936. It retains all the major subject material, but is totally rewritten, rearranged, and modernized.

The text deals with concepts and procedures involved in the appraisal of industrial, commercial, utility, and natural resource properties for which it is desirable that engineers perform the appraisal.

New additions have been made. There is a new chapter on the rate of return. There are complete and detailed discussions on depreciation and service lines with a new approach for appraisal and accounting purposes. An increased usuage of illustrative material has been adopted, and former illustrations have been redone. Figures on price and cost trends have been brought up to date.

Government Regulation

Government's Role in Economic Life. **By George A. Steiner. Published by McGraw-Hill Book Co, 330 West 42nd Street, New York 36, N. Y., 440 pages, illustrated. Price $6.**

This volume considers such important and varied aspects and contributing factors as pressure groups, the setting of policy, administrative machinery, the human factor involved, etc.

The book has as its aim to aid the student in an understanding of and clear thought about American experience in relation to the fluctuating role of government in economic life. In doing so, it develops a suitable methodology for dealing with current problems of public policy through a method of analysis which enables the student to concentrate on the relevant forces which produce public economic policies, and the consequences of following a given course of action.

It also presents underlying principles useful in guiding the evolution of policy, and discusses major problems and issues associated with economic policy.

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SAVED 13 Working Days!

At The E. Ingraham Company — world famous clock manufacturers of Bristol, Conn. — PLUGMOLD 2000 has proved again that it is EASIER, FASTER, CHEAPER to install. Using Plugmold — two men built this timer test rack in 2 DAYS. It formerly took two men 3 WEEKS to build the same rack using old type construction with ordinary wiring.

Wiremold's famous Plugmold 2000 gives you SURFACE mounted raceways — no drilling and cutting for outlet boxes! Saves time, effort, money!

Write today for the full Plugmold story and the new Plugmold 2000 book!

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Makers of
PLUGMOLD – multi-outlet systems
WIREMOLD – electrical raceways
PANCAKE – overfloor raceways
THE WIREMOLD CO.
Hartford 10, Connecticut

AD COPY THEMES

Alabama Power Co—A series of ads promoting electric cooking is marked by simplicity. See sample above.

Northern States Power Co—Full page newspaper ad made up almost entirely of pictures and captions told the story of company activities in 1952. All of the pictures had a lot of "life."

Annual Reports Comments

American Gas & Electric Co—Report lists these record highs for 1952: net earnings, sales of energy, peak kilowatt demand, operating revenues, and construction expenditures. Centerspread carries map of system and pictures of some of the cities it serves.

Arizona Public Service Co—Centerspread showing a map of its area on which are shown points of interest in Arizona is excellent.

Carolina Power & Light Co—Centerspread shows airplane views of four cities served by the company.

Empire District Power Co—Good charts are used throughout and interesting pie charts show from where money came and to where it went.

Iowa Electric Light & Power Co—A 15-year chart shows "Taxes of All Kinds."

Iowa Public Service Co—A map shows the transmission lines planned or in existence to interconnect six major Iowa companies.

CHEAPER TO INSTALL

PLUGMOLD 2000 *with* **SNAPICOIL**
by **WIREMOLD**

1 RACEWAY FOR 3 WIRING SERVICES

1

For the first time, ONE raceway that's designed to take all 3 wiring services — NEMA grounded,

2

2-wire Duplex "hot", and 3-wire Duplex receptacles, *one side switched, one side "hot"* . . . cheaper, because only 1 raceway needs to be taken to the job!

3

. . . cheaper, too, because the pre-wired Snapicoil receptacles are readily intermixed or replaced by the skilled electrician . . . cheaper because cutting and fitting are reduced to a minimum.

Write today for the new, free Plugmold 2000 book!

PLUGMOLD 2000
WIREMOLD'S *New* multi-outlet system
THE WIREMOLD COMPANY
Hartford 10, Connecticut

The 7-Range Clip-On Volt-Ammeter

FERRANTI

Offers These Important Advantages

- Measures up to 1000 amps up to 600 volts.
- Convenient ONE HAND operation trigger action.
- Thumb operated range selector switch.
- 7 ranges 5 current and 2 voltage.
- Insulated core shockproof construction.
- Takes cables up to 2¼" diameter.
- Distinct calibrations easy to read.
- Suitable for 50-70 cycles.

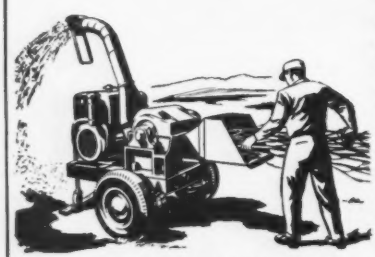
RANGES 0-10 *amps;* 0-25 *amps;* 0-100 *amps;* 0-250 *amps;* 0-1000 *amps;* 0-150 *volts;* 0-600 *volts.*

FERRANTI ELECTRIC, INC.

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

FERRANTI, LTD., Hollinwood, England — FERRANTI ELECTRIC, LTD., Toronto, Canada

SAVE up to 85% brush handling costs.



This new M & M brush grinder rapidly converts 7 truckloads of brush into one truck load of chips.

Save on labor costs . . . truck operating costs. One man feeds brush or branches up to 6" in diameter into the Brush Grinder where they are chewed into small uniform wood chips and automatically blown into a truck or spread on the ground. The new M & M Brush Grinder is a portable unit with its own power plant. It hitches to jeep, car or truck for transportation right to the job. Safe easy operation with all moving parts fully enclosed. Nearly 100 years of experience in building fine grinding equipment is your assurance of long dependable service from an M & M brush grinder. WRITE FOR ILLUSTRATED FOLDER TODAY.

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Niagara Mohawk

(*Continued from page* 140)

on the stock after that date. Because of the call for redemption the privilege of converting the Class A stock into Niagara Mohawk common stock on a share-for-share basis will cease June 30, 1953.

Holders of Class A stock who convert their shares into common stock on or before June 12, will receive the common dividend of 40¢ a share instead of Class A stock dividend of 30¢ per share, Machold stated. Dividends on the Class A and common stocks are payable on June 30 to stock of record June 12.

EEI's 1953 Rate Book Ready for Distribution

The 1953 edition of the rate book, published under the direction of the Rate Research Committee of Edison Electric Institute, is now available.

It covers rates for electric service supplied by privately operated companies to residential, commercial and power customers in all cities of the United States having a population of 20,000 and over, as well as a number of smaller cities in the less populated states.

Copies may be secured by writing Edison Electric Institute, 420 Lexington Ave, New York 17, N. Y. The price is $20 a copy to member companies and $30 to non-members.

Self-Funded Retirement Plans Favor Utility Bonds

A study by the publication, "Employee Benefit Plan Review," published by Charles D. Spencer & Associates, Inc, 166 West Jackson Blvd., Chicago 4, Ill., shows that public utility bonds are highly regarded by managers of self-funded retirement plans.

The sampling of 28 returns broke down the investments in these various plans by bonds, prefcrred, and common stocks. The size of the funds varied widely, all the way from about $75,000 to upwards of $30 million—the typical plan in the group was definitely in the millions.

Fourteen of the 28 plans broke down their bond and stock classifications into further detail; of these fourteen, the average investment in public

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Continuous Operating Temperatures up to 650°F. can be endured by Mycalex glass-bonded mica. Temporary rises even higher than that are feasible. The familiar old limitation of the temperature endurance of insulation can be pushed away up.

ACCURACIES CAN BE HIGHER

Mycalex Insulation can be produced to any precisions of which any metal is capable. Mycalex is dimensionally stable; it holds its precisions. Electrical components insulated with Mycalex can be fitted into permanent precision assemblies.

IT ALL ADDS UP TO GREATER CAPABILITY IN LESS SPACE

Mycalex Insulation is corona resistant, does not carbonize under arc, has nil moisture pick up. It all adds up to getting greater capability in less space by specifying Mycalex Insulation.

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World's Largest Manufacturer of Glass-bonded Mica Products
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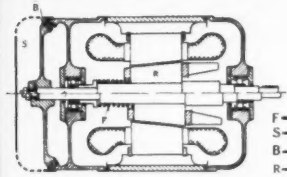
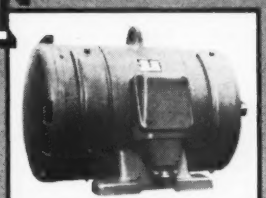
Quick STOP MOTORS ARE DESIGNED and BUILT for FAST STARTS and STOPS



Upper half: motor with brake released. Lower portion: components when brake is applied. When power is applied, rotor in brake-applied-position unbalances magnetic field, setting up a horizontal force releasing brake.



Available as drip-proof motor from .3 to 8 HP; as totally enclosed motor from .2 to 4 HP.

(up to 1000 drive-and-brake operations in 1 hour)

IN RUGGED USE

These are combination BRAKE and DRIVE, all-in-one units designed for rugged industrial service.

- No outside power source or special controls needed for applying or releasing the brake.
- Release brake and starts instantly when power is applied.
- Stops and brakes with 150% of normal torque when power is cut.
- No Creep—No Backlash.
- Can be reversed like any standard 3-phase motor.
- Mounts vertically or horizontally.
- Minimum maintenance. For example, brake linings last up to 30 million stops.
- World-famous for trouble-free performance.

Write for COMPLETE DATA and PRICES

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TREE PRUNING
SAWS

Bartlett offers quality saws for immediate delivery.

No. 127—PARAGON SAW. This curved blade, draw-cut pruning saw is ideal for all-around pruning. Best quality saw steel. Easy-grip handle. 22 ins. to 26 ins. Also available with D type handle.

No. 41—TUTTLE TOOTH. This popular saw is made in 20 and 24 inch lengths. Equipped with a special extra large handle. Tuttle tooth design is excellent for large cuts.

No. 124B—24 in. Special Utility Saw. Big, husky streamlined teeth make this the fastest cutting saw we have ever offered. Fast cuts are smooth and the operation made it easy to use and easy to recondition.

Ask for your free copy of catalog showing complete line of Pole Pruners, Pole Saws, Wire-Cutters and Safety Equipment for Tree Trimmers.

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STANDARD
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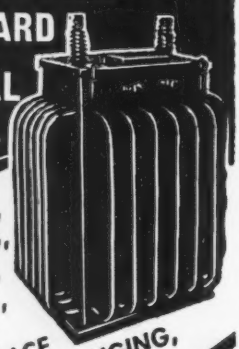
SPECIAL
AIR • OIL • WATER-COOLED



POWER, LIGHTING, HEATING, WELDING, ELECTRIC FURNACE PHASE CHANGING, ETC.

EISLER Transformers are built strictly to N. E. M. A., A. S. A. and A. I. E. E. standards.

SEND FOR NEW CATALOG NO. TR-50

⅛ TO 500 KVA
•
UP TO 15,000 V.

CHAS. EISLER
EISLER ENGINEERING CO., Inc.
769 SOUTH 13th ST. NEWARK 3 N. J. U. S. A.

utility bonds amounted to 23.06% of the entire fund.

Eight breakdowns of preferred stocks were reported; of these, the average investment in utility preferreds was 3.07%.

Another nine had a breakdown of the investments in common stocks; of these, the average was 5.58%.

Among the public utility bond holdings, the lowest proportion of the entire fund portfolio was 6.26%, the largest, 41.26%. Of the 14 plans detailed in this classification, five showed utility bond investments ranging from 20% to 26% of the total assets.

Rates for House Heating Reduced by Chelan PUD

The Chelan County PUD at Wenatchee, Wash., has reduced its rate for electricity used in house heating from 1.8¢ per kwhr to 1¢, the same as for other uses.

"The previous higher rate was intended as only temporary," said L. J. Richardson, chairman of the PUD board. "We needed a couple of years operating experience after selling off the Douglas County properties in 1950 to make sure this step could be taken without impairing our financial status nor adversely affecting our service.

"It is now proven that electricity is being more widely used every day by the public for greater efficiency and more comfort in the fields of cooking, lighting, cooling and heating."

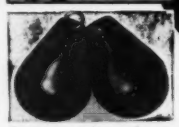
Since the PUD went into business in 1948, it has accumulated a debt-free equity of $988,146, of which $542,899 was used to retire bonds and $455,247 was re-invested, Richardson said. For the 12 months ended Feb. 28, number of customers increased 5% to 11,937.

Workers to Buy Stock

Pacific Power & Light Co has moved ahead in its stockholder approved plan to make shares of the utility's no par value common stock available to employees under an easy-payment purchase program. Vice Pres John Dierdorff reports application for approval has been received from the Federal Power Commission. The proposals calls for sale of up to 15,000 shares at a price based on 95% of prevailing market value in the month preceding purchase.

Safe, Easy to Use
Long Lasting...

Modern, Pear-shaped
ARco
Sponge Rubber Covered
HAND-LINE THROWING WEIGHT



Cross section shows lead core; sponge rubber sheath; metal eyelet.

• Tested, proven; the ARco Hand-Line Throwing Weight reduces personal injury and property damage. Has lead core inside sponge rubber shell, coated with black rubber. Size — 4¼" x 3". Weight — 13½ oz.

Write or wire for volume prices. Literature available on request.

Anything can be covered with RUBBER — by ARco
AUTOMOTIVE RUBBER CO., INC.
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drills 6 inches of concrete per minute!

...gives lowest cost per foot of concrete drilled with a TILDEN Rotary Konkrete Kore Drill. Two-thirds more cutting surface make Tilden 70% more efficient. Drills 5 to 7 times more holes without resharpening — even reinforced concrete. Free factory resharpening! Use with any electric or air drill. 29 standard sizes, 3/16" to 4". Interchangeable shanks up to 60".

TILDEN
ROTARY
KONKRETE KORE
drill

Patented core slot expels cuttings automatically!

U.S. Pat. No. 2506474

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STRONGER THAN THE PIN

In laboratory tests to determine the torsion strength of Kimble *Tempered* Glass Insulators, wood pins were sheared off, and lead-bushed threads stripped, with no failure of the Insulators. Cantilever tests using special alloy pins were discontinued at 10,000 lbs. with still no failure. Ultimate impact tests averaged 130 inch pounds!

Kimble *Tempered* Glass Insulators save installation time because it's never necessary to loosen for lineup with the conductor. Their great strength always allows another quarter-turn.

If it's on the pin, it's in service

Tests far in excess of A.I.E.E. standards have proved it impossible to puncture a Kimble *Tempered* Glass Insulator in air. Even lightning surges have failed to damage them. In the event of shattering due to severe mechanical shock, insulator disintegrates into small, non-sharp fragments. Trouble shooters can locate broken insulator—fast.

What's the secret? *Tempering*, a Kimble development in glass insulators that adds a new element to the many natural virtues of glass insulators. Kimble insulators are more than strong enough to meet the severe tests required.

Why not see how *tempered* glass can cut your line maintenance costs. Write for the new descriptive folder that gives complete details. Address: Kimble Glass Company, Department EW-6, Box 1035, Toledo 1, Ohio.

KIMBLE GLASS COMPANY
Toledo 1, Ohio—*Subsidiary of Owens-Illinois Glass Company*

DEPRECIATION

And Its Crucial Economic Role

The sixth annual McGraw-Hill survey of Business' Plans for New Plants and Equipment, just completed, reveals some remarkable facts about the role of depreciation in our economy. To most people, depreciation is a technical term, used by accountants to discuss a dull subject. But it really is a simple matter: It is the amount of money set aside each year by a company to replace plant and equipment that is wearing out. And here are some facts from this survey* which show how depreciation can make the difference between prosperity and recession in the United States:

1. *In 1953, about half of all the money spent on new manufacturing plants and equipment will come from depreciation reserves.* For the future, manufacturing companies are relying even more heavily on this source of money. In the years 1954-56, they count on using their depreciation funds to pay for almost two-thirds of the new plants and equipment now planned.

2. *The amounts of money made available by depreciation allowances vary greatly from industry to industry.* Some industries, such as those producing steel, chemicals and petroleum products, will have relatively large amounts of cash available from their depreciation reserves. In considerable measure, this is because the government is allowing them to accumulate such reserves at an accelerated rate as an encouragement to build facilities required for national defense. But most of the companies engaged in the production of textiles, processed foods and many kinds of machinery have had little chance to benefit by this provision for accelerated depreciation. Hence, they have much less money available from depreciation reserves.

3. *There is a definite shortage of investment funds in the industries that have relatively low depreciation allowances.* Taken together, the coal mining, textile, food processing, machinery and other metal-fabricating industries plan to spend about $4.7 billion for new plant and equipment this year. But they report that they would spend $1.5 billion *more* per year during the period 1954-56 if sufficient funds were available.

4. *Eighty-five per cent of the manufacturing companies covered by the survey reported that they plan to invest all their depreciation funds* to keep equipment up-to-date and to provide capacity for new products and new markets. These companies could let their depreciation funds pile up as idle cash. But the intention is to spend most of them for capital equipment.

*The sixth annual McGraw-Hill survey of Business' Plans for New Plants and Equipment included companies that provide 25 per cent of all industrial employment and 60 per cent of employment in those industries where capital investment is highest. These companies are mostly the larger companies in their respective industries. A copy of the full report of this survey can be obtained by addressing: Department of Economics, McGraw-Hill Publishing Company, Inc., 330 West 42nd St., New York 36, N. Y.

Hence, there is a direct relationship between the amount of depreciation funds available and the level of capital investment. And it is upon the latter that the level of general prosperity decisively depends. One-third of all industrial workers are engaged in producing or installing such equipment.

This fact that the level of depreciation allowances has a major bearing on the level of capital investment should not surprise anyone. In several foreign countries where these allowances have been increased, investment has boomed. The two nations with the highest ratios of investment to national income are Canada and Norway. Both countries adopted flexible depreciation policies after World War II. In Sweden and The Netherlands also, flexible depreciation allowances have contributed to rapid industrial expansion. Finally, the tremendous investment brought about by our own rapid amortization program shows dramatically the importance of depreciation in stimulating capital expenditures.

Obsolete Tax Laws

In spite of this record, the fact remains that our laws and the business procedures that govern depreciation allowances—in particular the laws and rulings that govern the deduction of depreciation from taxable corporate income—are still based on antique and obsolete accounting concepts which take no account of depreciation's dynamic role in our economy. The internal revenue code still requires most companies to depreciate their equipment over a long period, even though these small annual allowances cannot possibly pay for the investment that is necessary to keep a plant up-to-date under today's rapidly changing technology, with its production of new and improved machinery.

The only allowance made by the government for rapid depreciation is that which is authorized for certain types of plants during the defense emergency. Under this policy most companies are unable to use accelerated depreciation for tax purposes. And as defense projects are completed, the number of new authorizations is dropping. We may lose the chance to utilize fully this powerful tool for sustaining investment because, under our ramshackle emergency tax structure, accelerated depreciation is available only to a minority of firms on a temporary basis.

New Policy Needed

A sensible, up-to-date depreciation policy for tax purposes is long overdue. Either the Treasury must modernize the internal revenue code on its own initiative, or Congress must take the lead by writing into permanent law a flexible depreciation policy applicable to all companies.

Treasury experts now have before them a number of proposals to allow faster depreciation for the average firm. The U.S. Chamber of Commerce has suggested that companies be allowed to deduct from taxable income 25 per cent of the cost of new equipment in the first year, with the remaining cost to be deductible over the life of the facilities. The Machinery and Allied Products Institute has long sponsored a formula that would allow full deduction in two-thirds of the estimated life of the property. In Congress, Chairman Reed of the Joint Committee on Internal Revenue Taxation has stated that we need a more flexible depreciation policy. Senator Frear of Delaware has introduced a bill that would let a business make its own choice on how fast to depreciate its equipment.

It will take time and study to determine which of these various proposals best fits the needs of the economy without sacrificing unduly the revenue needs of the government. If we are to have a new depreciation policy, designed for a long period ahead, it must be carefully worked out. But this much is clear right now: *The development of a flexible depreciation policy on the part of the federal tax authorities is one of the most important steps that can be taken to sustain prosperity. When we talk about depreciation, we are talking about the money that pays for almost two-thirds of the new manufacturing facilities now scheduled for construction. We are talking about the new investment and the new jobs on which our continued prosperity depends.*

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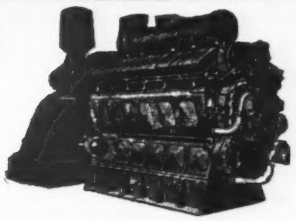

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750	General Motors	12-567	1080	720	150	Worthington	CC-4	225	450
500	Baldwin	VO-8	750	514	150	Buckeye	50	340	600
500	General Motors	8-278A	750	720	100	Worthington	BB-5	150	600
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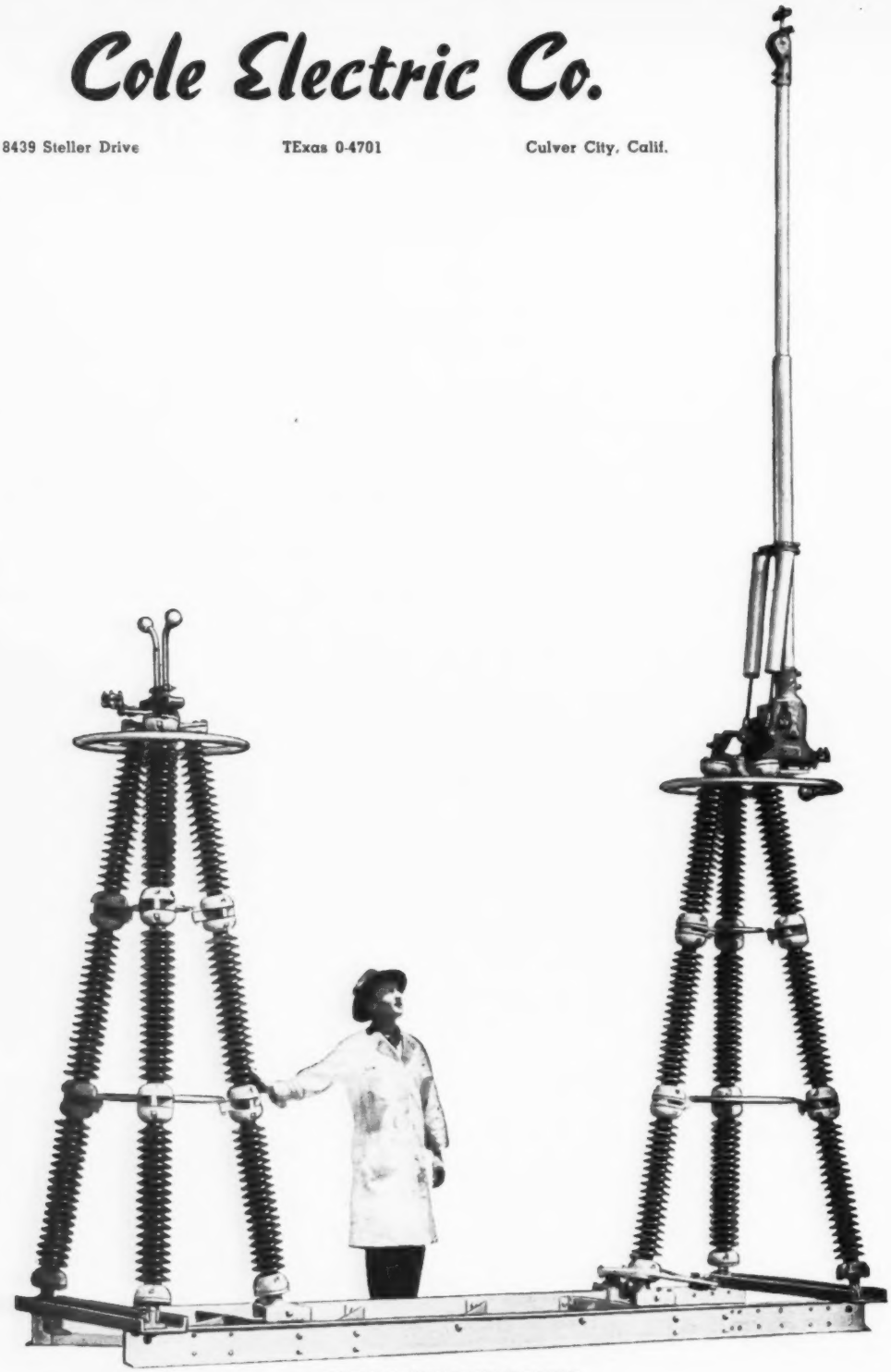

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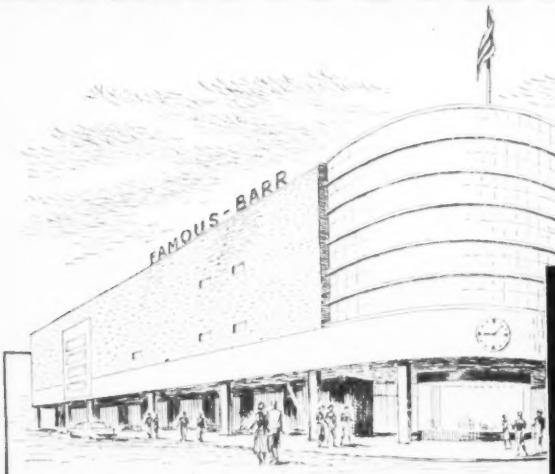

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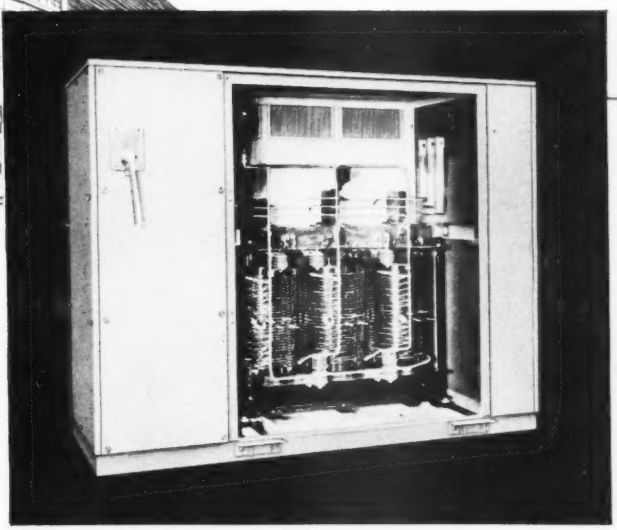

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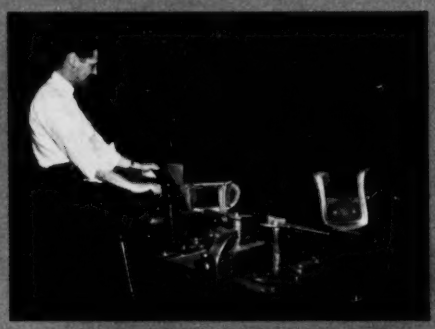
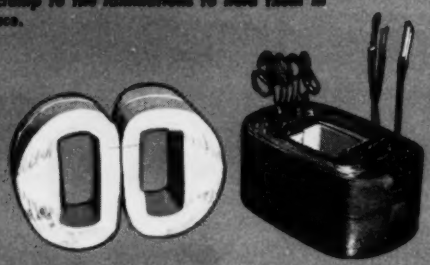
HOW KUHLMAN BENT IRON CORES ARE MADE

By way of celebrating a 20th anniversary, this brief picture-story shows the present-day manufacture of the now famous Kuhlman Bent Iron Core. The patent on this efficient core, (no. 1,933,140) was granted in 1933—yet so advanced was its design that today its essential characteristics remain the same and have influenced the design of many makes of transformer cores.

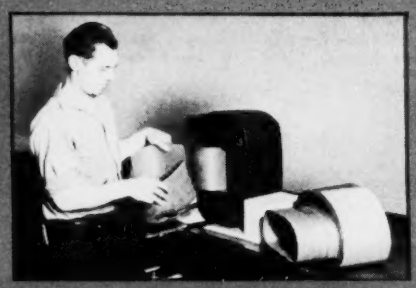
First, the laminations are cut to size and stacked. The operator clamps the stacks onto a hydraulic folding machine which bends them over a form into a U-shape. Before removing the pressure, the operator applies a clamp to the laminations to hold them in place.



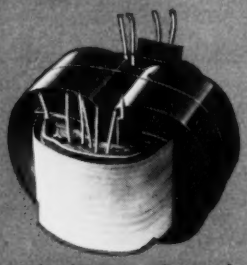
Another operator completes the bending by overlapping each alternate lamination. Levers on each side of the vise hold down each lamination as it is folded into place. The inner laminations have been cut shorter so that the outer ones will overlap.



After the cores have been bent they are bound with wire and annealed to relieve the stresses caused by bending. Here are two annealed Bent Iron Cores next to the coil to which they will be assembled.



The assembler has disassembled a core and is now filling the coil lamination by lamination. The laminations retain their shape because they have been annealed. As soon as he has assembled a core to the other side of the coil, he will bind the whole assembly tightly together.



Here is a completed Bent Iron Core and coil assembly. The four air gaps of the old butt type core have been reduced to two, and the magnetic flux will always flow parallel to the grain of steel, never crossing it.

This is a recent variation of the Bent Iron Core, known as the BIE. Notice that the laps are at the top rather than at the sides. This allows for the manufacture of Bent Iron Core transformers of higher KVA rating without increasing the overall size of the transformer.

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